

S  
14.GS:  
OFS 1995-7

*Geol Survey*

**REVIEW OF THE CITY OF LAKE FOREST FINAL  
REPORT FOR THE 1994 BEACH AND NEARSHORE  
MONITORING PROGRAM, FOREST PARK BEACH,  
LAKE FOREST, ILLINOIS**

C. Brian Trask and Michael J. Chrzastowski

Illinois State Geological Survey  
Lakes, Streams, and Wetlands Unit  
615 East Peabody Drive  
Champaign, Illinois 61820-6964

May 1995

Submitted to:

Illinois Department of Transportation  
Division of Water Resources  
310 South Michigan Avenue, Room 1606  
Chicago, Illinois 60604

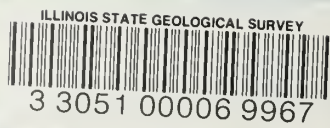
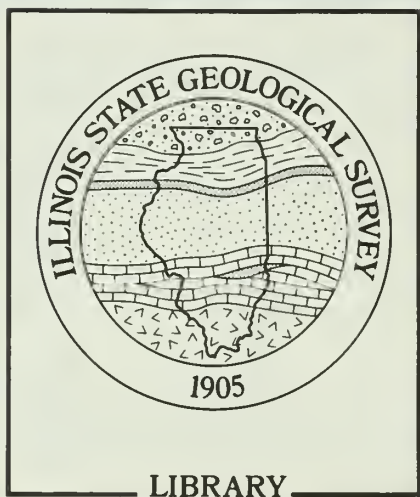
Final Report For IDOT Project No.: WR-09118/SRA-190

Illinois State Geological Survey  
Open File Series 1995-7

LIBRARY

NOV 22 1995

IL GEOL SURVEY



**REVIEW OF THE CITY OF LAKE FOREST FINAL  
REPORT FOR THE 1994 BEACH AND NEARSHORE  
MONITORING PROGRAM, FOREST PARK BEACH,  
LAKE FOREST, ILLINOIS**

C. Brian Trask and Michael J. Chrzastowski

Illinois State Geological Survey  
Lakes, Streams, and Wetlands Unit  
615 East Peabody Drive  
Champaign, Illinois 61820-6964

May 1995

Submitted to:

Illinois Department of Transportation  
Division of Water Resources  
310 South Michigan Avenue, Room 1606  
Chicago, Illinois 60604

Final Report For IDOT Project No.: WR-09118/SRA-190

Illinois State Geological Survey  
Open File Series 1995-7

LIBRARY

NOV 22 1995

IL GEOLOGICAL SURVEY



Digitized by the Internet Archive  
in 2015

<https://archive.org/details/reviewofcityofla1995tras>

## EXECUTIVE SUMMARY

Beach and nearshore morphology was monitored at Forest Park Beach, Lake Forest, Illinois in the summer of 1994 as part of the fourth year of a planned 5-year monitoring program. The responsibility of annually collecting and presenting survey data for 5 years rests with the City of Lake Forest. The Illinois State Geological Survey (ISGS) independently collects and summarizes data to provide a check on the work by the City and to provide supplemental data and interpretation. The ISGS participation in this coastal monitoring program is partially supported under a contractual agreement with the Illinois Department of Transportation (IDOT) Division of Water Resources (DWR).

During the 1994 coastal monitoring, the ISGS collected profile data in June, July, and August, corresponding generally to the time of the City's profiling. A total of 28 profiles were run, including (1) the 15 long lines of the monitoring plan approved by the permitting agencies, (2) four lines added in 1992 at the discretion of the ISGS for additional areal coverage, and (3) nine beach-cell lines, comprising two lines in each of the four beach cells and one additional line in Beach Cell 4. Comparison of the ISGS profile data with the data collected by the City of Lake Forest verifies the reproducibility of the profile data.

Comparison of 1993 and 1994 topographic and bathymetric data indicates that the dominant process during the 1993-1994 period was accretion. Accretion occurred in the updrift nearshore bar and in Beach Cell 1, lakeward of Beach Cell 4, on the lakeward margin of Breakwaters I and II, and in the groin field south of the project. Erosion occurred mainly at the lakeward margins of Breakwaters III and IV and in the southern part of Beach Cell 4. The maximum thickness changes for accretion were on the order of 3 to 4 ft (0.9 to 1.2 m), while those for erosion were 1 to 2 ft (0.3 to 0.6 m). Maximum thickness of accretion occurred in the southern part of Beach Cell 1, near a depression mapped in preceding years. Thick accretion also occurred lakeward of Beach Cell 4 in a depression that has slowed the development of a sand bypass mechanism at Forest Park Beach. The source of the sediment forming the accretion in the downdrift groin field is a combination of natural bypass of the project and nourishment supplied by the City following monitoring in 1993. The maximum thickness of erosion occurred on the lakeward side of Breakwater IV.

Volumetric analyses of beach and lake-bottom accretion and erosion between 1993 and 1994 were conducted by the ISGS and by a consultant for the City (W.F. Baird & Associates, Ltd.) using a computer-assisted comparison of bathymetric data from these two years. There is some variation between the two analyses because some factors in the analyses differed (e.g., slightly different areal boundaries were used for the calculations). In general, however, agreement was relatively close, and thus the values reported by the consultant are considered a reasonable representation of net volumetric changes in the monitoring area between 1993 and 1994. For changes landward of the sand/clay interface (approximately the 12-ft contour for most of the monitoring area and the 15-ft contour for the area opposite Beach Cell 4 and Breakwaters I and II), the two analyses agree on a 1993-1994 net change of approximately 30,500 cu yd (23,300 cu m) of accretion (ISGS: 32,800 cu yd [25,100 cu m]; City: 28,300 cu yd [21,600 cu m]). This change uses a 0-ft threshold, which includes all accretion and erosion; this level of detail is possible because of the accuracy of the 1993 and 1994 total-station data.

This calculation of volumetric change ignores the area lakeward of Breakwater I and lakeward of the southern revetment for which the City did not collect data prior to 1994. For this area, ISGS data indicate that net accretion occurred in 1993-1994 (+6,400 cu yd [+4,900 cu m]). Thus, for the entire monitoring area, ISGS data indicate the 1993-1994 net change was approximately 39,200 cu yd (30,000 cu m) accretion.

This is the largest single-year net accretion to be documented in the ongoing 5-year monitoring program. However, wide yearly fluctuations can occur in accretion and erosion. The long-term record is thus important. For the interval between 1987 and 1994, at a 1-ft threshold (1987-1992) and a 0-ft threshold (1992-1994), the net change in the monitoring area has been accretion totaling 69,000 cu yd (52,800 cu m).





Accretion patterns, lake-bottom morphology, and location of the sand/clay interface are various indicators that an accumulation of sand continues to form on the lakeward margin of the project. This accretion is part of a process of building an accretionary wedge or "sand bridge" for natural bypass of littoral sediment around the facility. This accretionary wedge is essentially a southward (downdrift) continuation of the bar that has been present on the updrift end of the facility since the early post-construction history. As of the 1994 survey, the downdrift leading edge of this accretion was located opposite Breakwaters I and II. Extensive southward advance occurred between 1993 and 1994. Accretion continued infilling an area of depression on the lake floor having depths of 10 to 13 ft (3 to 4 m), which is somewhat shallower than 1993 bathymetry data indicate. This area of depression is opposite Beach Cell 4 and Breakwaters I and II. The infilling has slowed the southward advance of this accretionary wedge. Evidence from the 1994 monitoring suggests, however, that an apron of sand has formed across this depression and bypass has begun adjacent to Breakwater II.





# CONTENTS

EXECUTIVE SUMMARY .....	i
INTRODUCTION .....	1
Units of Measure .....	5
Purpose and Scope .....	5
<b>PART 1: DATA COLLECTION AND PRESENTATION .....</b>	<b>6</b>
ISGS FIELD PROCEDURES .....	6
Fathometer Survey Procedures .....	6
Fathometer Survey Coverage .....	8
Prism-Pole Surveys .....	11
Field Schedule .....	11
ISGS DATA PROCESSING .....	15
REVIEW OF THE CITY OF LAKE FOREST PROFILING PROCEDURES AND SURVEY GRID ....	17
Beach Profiling .....	18
Nearshore Profiling .....	18
General Statement on City of lake Forest Profiling Procedures .....	18
COMPARISON OF ISGS AND CITY OF LAKE FOREST PROFILES .....	18
Comparison Summary .....	18
Spurious points .....	18
Profile vertical displacement .....	18
Profile discrepancies at revetments and breakwaters .....	21
Conclusion .....	21
AREAL AND VOLUMETRIC TRENDS IN ACCRETION AND EROSION .....	21
Bathymetric/Topographic Maps .....	21
Beach and Nearshore Change Map .....	26
Volumetric Changes 1993-1994 .....	26
Volumetric Changes 1987-1994 .....	32
<b>PART 2: COASTAL PROCESSES .....</b>	<b>34</b>
INDICATIONS OF LITTORAL SEDIMENT BYPASS .....	34
Sand/Clay Interface .....	34
Lake-Bottom Morphology .....	34
<b>PART 3: SUMMARY .....</b>	<b>37</b>
RECOMMENDATIONS FOR FUTURE MONITORING AND REPORTING .....	37
CONCLUSIONS .....	38
ACKNOWLEDGMENTS .....	41
REFERENCES .....	42
DISTRIBUTION LIST .....	43
APPENDICES .....	
A ISGS Fathometer Traces for June and July 1994 .....	A 1
B ISGS June and July 1994 Long Profiles .....	B 1
C Comparison of ISGS and City of Lake Forest 1994 Beach and Nearshore (Short) Profiles .....	C 1
D Calculations of Accretion and Erosion at Forest Park Beach .....	D 1
E Tabular Data for ISGS 1994 Prism-Pole Surveys and Fathometer Surveys .....	E 1



**FIGURES**

1	Illinois shore of Lake Michigan .....	2
2	Forest Park Beach and environs .....	3
3	Numerical designation used for the six breakwaters and the four beach cells at Forest Park Beach .....	4
4	ISGS survey boat with survey gear installed .....	7
5	ISGS transit set up on control point for the profile line .....	7
6	ISGS survey boat navigating toward the shore along a profile line .....	8
7	Location and designation of fathometer profile lines surveyed by the ISGS .....	9
8	Location and designation of profiles surveyed by the City of Lake Forest .....	10
9	Location and designation of 1994 profiles surveyed by the City of Lake Forest and duplicated by the ISGS .....	12
10	ISGS prism-pole surveying operation .....	13
11	Survey control points used to establish profile locations and azimuths .....	14
12	City of Lake Forest profiling operations .....	19
13	City of Lake Forest small boat .....	19
14	City of Lake Forest loader grading the beach in Beach Cell 4 .....	20
15	1993 nearshore bathymetry of the Forest Park Beach area .....	22
16	1994 nearshore bathymetry of the Forest Park Beach area .....	23
17	1993 nearshore bathymetry and beach topography of Forest Park Beach .....	24
18	1994 nearshore bathymetry and beach topography of Forest Park Beach .....	25
19	Beach and nearshore changes, 1993 to 1994 .....	27
20	North end of Forest Park Beach .....	28
21	Zones of the monitoring area .....	29
22	Location of the interface of lake-bottom sand and glacial till .....	35
23	Location of 10-ft and 12-ft bathymetric contours in 1993 and 1994 .....	36

**TABLES**

1	Abbreviations for U.S. Customary and metric units .....	5
2	1994 daily data collection by the Illinois State Geological Survey .....	15
3	Lake levels in feet above given datum at Calumet Harbor, Illinois, and Milwaukee, Wisconsin .....	16
4	Comparison of ISGS accretion and erosion calculations with those performed by the City of Lake Forest during the 1994 monitoring season .....	30
5	Comparison of ISGS accretion and erosion calculations with those performed by the City of Lake Forest during the 1994 monitoring season .....	31
6	Volumes of material accreted to or eroded from Forest Park Beach since 1987 .....	33

**PLATE**

1	Nearshore bathymetry and beach topography .....	pocket
---	---	--------



## INTRODUCTION

This report is the fourth in a series of five annual reports to be prepared by the Illinois State Geological Survey (ISGS) concerning annual monitoring of beach and nearshore morphology at Forest Park Beach on the shore of Lake Michigan at Lake Forest, Illinois (fig. 1).

Forest Park Beach is a lakeshore park and beach facility (fig. 2) built by the City of Lake Forest. Construction was completed in 1987. This 22-acre (8.9-hectare) facility consists of six rubble-mound breakwaters, four beach cells, a boat-launch basin, parking, walkways, beach houses, and park land (figs. 2 and 3). Forest Park Beach was constructed primarily to provide shore defense and to stabilize the City's lakeshore park land, and secondarily to provide lakeshore recreation (Anglin et al. 1987).

Permits for construction of Forest Park Beach were issued by the Illinois Department of Transportation (IDOT) Division of Water Resources (DWR) and by the Chicago District of the U.S. Army Corps of Engineers. These permits required that, following completion of construction, a 3-year annual monitoring program be conducted to document any changes to the beach and nearshore caused by the project. Of primary concern was the potential entrapment of littoral sediment against the north (updrift) side of the project and the resulting deprivation of littoral sediment leading to possible erosion along the shore to the south (downdrift) of the project.

One of the recommendations presented in the summary report for the 3-year monitoring program was to continue the monitoring for another 5 years (Lake Forest Shoreline Monitoring Committee 1990a). As part of this new monitoring program, IDOT-DWR contracted with the ISGS to evaluate the data collection and gather independent data for comparison and validation of the data collected by the City of Lake Forest and its consultants. All requirements for the annual monitoring were defined by the Chicago District, U.S. Army Corps of Engineers.

The first year of this new annual monitoring program was 1991. Monitoring data were collected for the City of Lake Forest by a survey team from the Bellevue, Washington, offices of the consulting firm CH2M HILL. The technical report for the 1991 monitoring (CH2M HILL 1992) was reviewed and the data collection validated by the ISGS (Chrzastowski and Trask 1992).

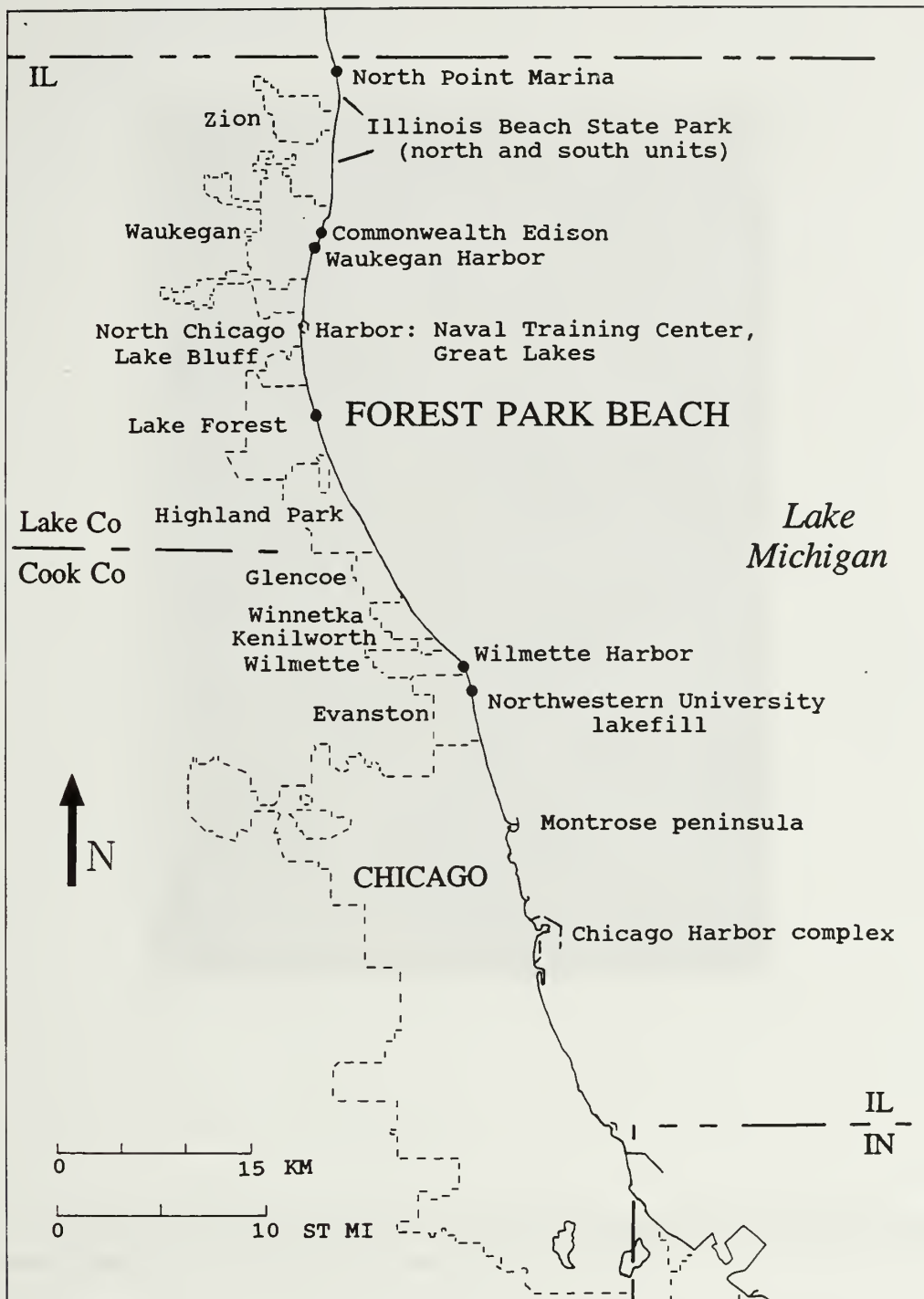
The second-year (1992) monitoring differed from the first year in that the City of Lake Forest did the majority of data collection and data processing for the annual monitoring. The engineering firm Manhard Consulting, Ltd. of Vernon Hills, Illinois, was contracted by the City to establish all horizontal control and collect data on offshore positioning. The firm Hydrographic Survey, Inc., of Chicago was contracted to provide diver-obtained data on the location of the sand/clay interface within the limits of the monitoring project and to determine if any lake-bottom erosion had occurred at 12 reference stakes set in 1991. The report summarizing the 1992 annual monitoring was completed by the City of Lake Forest in March 1993 (Magnus 1993a). A supplement to the final report, which provided volumetric calculations of 1988-1992 accretion and erosion, was completed in August 1993 (Baird & Associates 1993a). The technical report for the 1992 monitoring was reviewed and the data collection validated by the ISGS (Trask and Chrzastowski 1993).

The third-year (1993) monitoring at Forest Park Beach was conducted in a similar manner as the second year, with the City of Lake Forest primarily doing the data collection and processing with assistance from the engineering firm Manhard Consulting, Ltd. (Magnus 1993b). Calculations of accretion and erosion were conducted for the interval from 1992 to 1993 (Baird & Associates 1993b). The technical report for the 1993 monitoring was also reviewed and the data collection validated by the ISGS (Chrzastowski and Trask 1994).

The fourth-year (1994) monitoring program at Forest Park Beach was conducted in a similar manner to the third year, except that nourishment was not required nor emplaced. The City of Lake Forest performed the data collection and processing, and Manhard Consulting, Ltd. assisted. Diver survey tasks were carried out by Hydrographic Survey Company, while volumetric analysis of accretion and erosion was performed

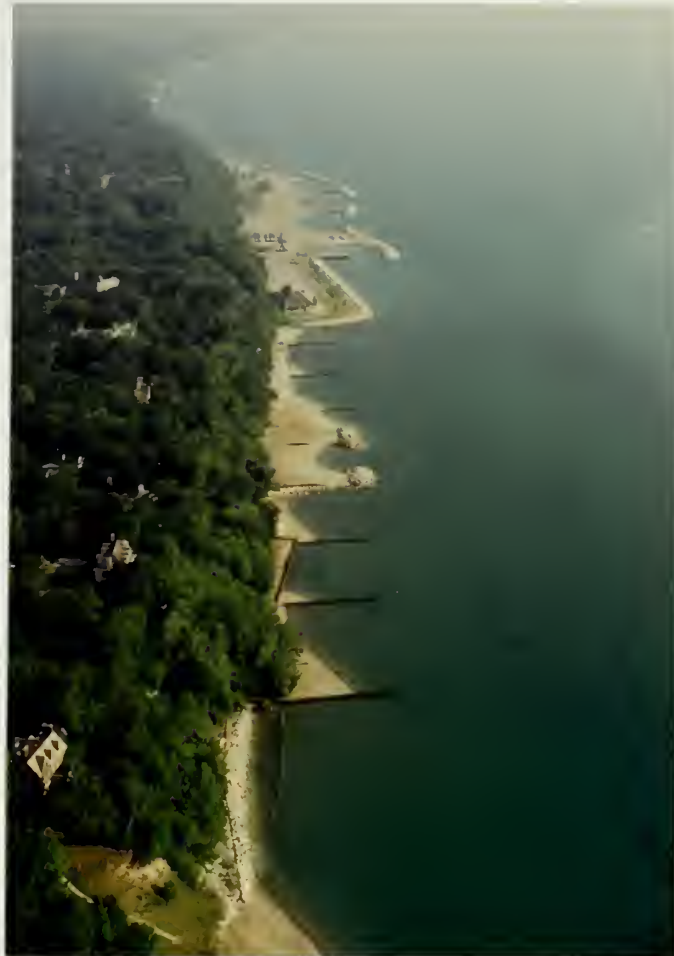






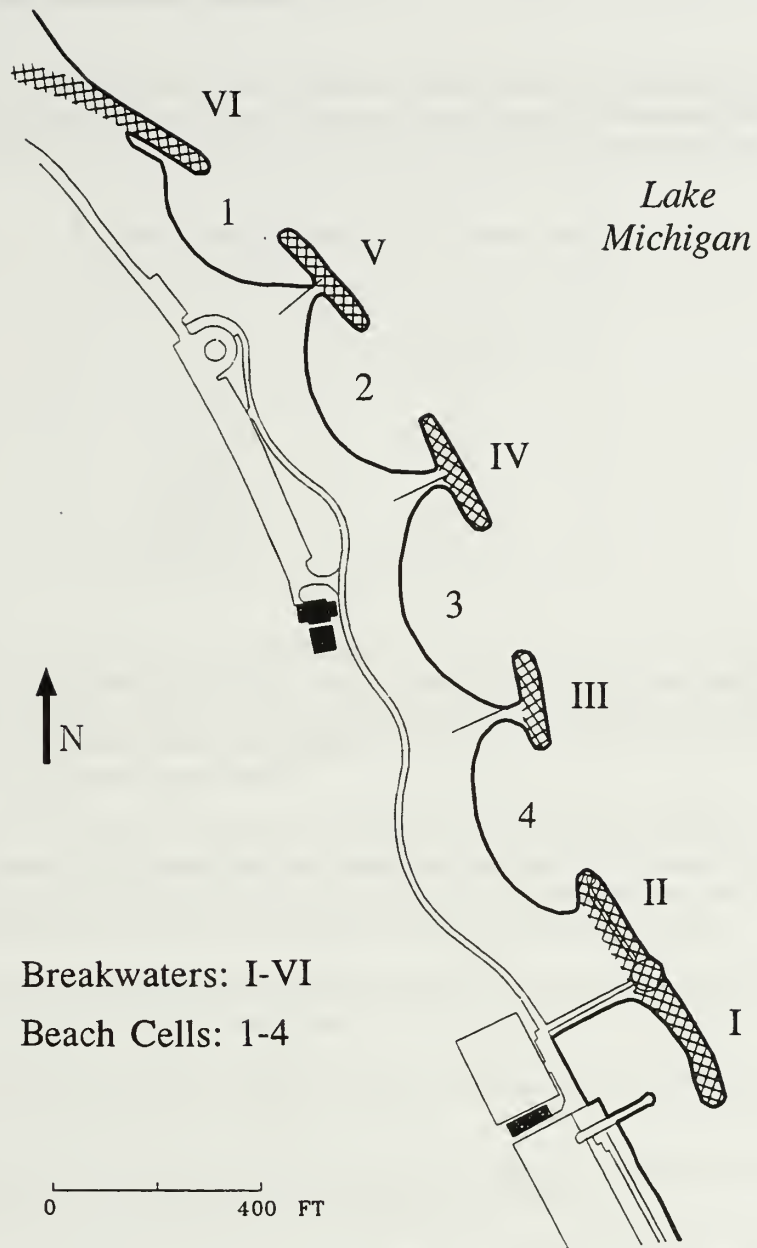
**Figure 1** Illinois shore of Lake Michigan showing the location of Forest Park Beach and other major engineered structures along the northern Illinois coast.





**Figure 2** Forest Park Beach and environs. View is from the south looking north along the lake shore across the groin field south of the park (date of photo: June 21, 1994).





**Figure 3** Numerical designation used for the six breakwaters (Roman numerals; south to north) and the four beach cells (Arabic numerals; north to south) at Forest Park Beach.





by W.F. Baird & Associates, Ltd. The technical report for the 1994 monitoring (Magnus et al. 1994) is the subject of review and data validation of this report.

### Units of Measure

Both U.S. Customary (i.e., English) and metric units are used in this report. Primary reference in the text is to U.S. Customary units, with metric equivalents given in parentheses. Abbreviations for units are used throughout the text. Table 1 gives the various units of measure and the abbreviations used in this report.

Table 1 Abbreviations for U.S. Customary and metric units.	
Unit	Abbreviation
foot	ft
cubic yard	cu yd
mile	mi
meter	m
cubic meter	cu m
kilometer	km

### Purpose and Scope

The role of the ISGS in the coastal monitoring program at Forest Park Beach is that of a scientific and technical reviewer of the data collection, processing, and reporting of the City of Lake Forest. As part of this role as a scientific and technical reviewer, the ISGS is responsible for independently collecting monitoring data and making field observations within the monitoring area at Forest Park Beach for comparison with the data collected by the City and its consultants.

For the Forest Park Beach monitoring program, the ISGS is under contractual obligation to IDOT-DWR, the state agency responsible for regulatory functions along the nearshore and offshore zone of the Illinois coast of Lake Michigan. As part of its program to assure proper coastal management and mitigation, IDOT-DWR has specific interest in the quality of the Forest Park Beach monitoring program.

The scope of work for the ISGS has essentially been the same for each of the first 4 years of this 5-year program. The specific scope for 1994 was as follows.

- Observe and document the 1994 data collection by the City of Lake Forest and independently repeat selected profile lines for comparison.
- Review the adequacy of the annual report prepared by the City of Lake Forest for the 1994 monitoring and summarize this review in a report to IDOT-DWR.
- Collect profile data along all 15 of the so-called "long-profile lines," which are profile lines extending to approximately 2,600 ft (800 m) offshore, as outlined in the initial monitoring requirements for the 5-year monitoring program.
- Incorporate and archive all data collected by the ISGS into the existing ISGS database on coastal geology and geomorphology for the Illinois coast of Lake Michigan.

Two aspects of this report for the 1994 coastal monitoring are worth noting. (1) During the 1994 monitoring, the City of Lake Forest surveyed four additional profiles, originally established and surveyed only by the ISGS, in order to monitor sand movement to the south beyond Breakwaters I and II. The City does not have data from this area for prior years, so determination of accretion and erosion in this area was again done solely by the ISGS. (2) A task included in the three previous reports (1991, 1992, and 1993)—to verify the



adequacy of nourishment sand placed at the south end of the project—is not included in this report because no nourishment was performed in 1994. The City completed the required nourishment program in 1993.

## **PART 1: DATA COLLECTION AND PRESENTATION**

### **ISGS FIELD PROCEDURES**

#### **Fathometer Survey Procedures**

Lake-bottom profiling by fathometer was conducted in the same manner as that done by the ISGS during the 1991, 1992, and 1993 monitoring. In addition, the same equipment was employed as was used in 1991, 1992, and 1993. Photocopies of the original fathometer traces are located in Appendix A.

Collection of fathometer data required a three-person team—two persons in a survey boat and one person onshore. The boat was a 12.5-ft (3.8-m) "Zodiac-type" inflatable having a 9.9-horsepower outboard motor (fig. 4). The onboard fathometer was a Ross Model 803 Portable Survey Fathometer<sup>1</sup> with a 100-kiloHertz (kHz) transducer. The transducer was mounted over the port side of the boat with a 0.5-ft (0.15-m) transducer depth. Transducer depth is not a factor in reading the fathometer traces because the Ross Model 803 fathometer has an adjustment that allows compensating for this depth. At the beginning of each survey day, calibration of the fathometer was verified with a bar check by lowering a steel grate below the transducer and producing a fathometer record at 1-ft (0.3-m) intervals from 2 to 12 ft (0.6 to 3.7 m); calibration was also verified by comparison with depths obtained by lowering a stadia rod to the lake floor and noting the level of the lake surface on the rod.

Position control for the fathometer surveys was by a range/azimuth technique. The onshore field assistant used a surveyor's transit positioned over the control point for the profile line that had been surveyed and marked by the City of Lake Forest's consultant (fig. 5). The transit was oriented along the azimuth of the profile line. As the survey boat advanced toward shore (fig. 6), the transit operator gave radio calls or visual signals to the boat operator to keep the boat within one boat width (5.6 ft [1.7 m]) of the profile line (i.e., the transit center line). Approximate boat speed during profiling ranged from 2 to 3 knots (3 to 5 ft/s [0.9 to 1.5 m/s]).

Offshore distance to the survey boat was measured using a Motorola Mini-Ranger III system. The Mini-Ranger measures distance in meters by calculating the travel time of a microwave signal between a transceiver and transponder. The transceiver and console were aboard the survey boat (figs. 4 and 6); the transponder was onshore (fig. 5), placed at a known location on the profile line, usually beneath the transit at the profile control point. The fathometer operator monitored the digital display of distance on the Mini-Ranger console and made an event mark on the fathometer trace at 10-m (32.8-ft) intervals. For reference, a bolder mark was made at 50-m (164-ft) intervals by slightly longer depression of the event button (see Appendix A). Profile start time was noted to permit water-level corrections during data processing. Profiles began offshore at a distance of 800 to 900 m (2,625 to 2,950 ft) and continued toward shore to a water depth of about 2 ft (0.6 m). In order to acquire a continuous onshore to offshore profile, beach and nearshore profiling with a total station and prism pole (see Prism-Pole Surveys) was conducted as a continuation for each of the fathometer lines and overlapped the fathometer lines for a distance of 8 to 117 ft (2.4 to 36 m). An exception occurs at some breakwaters or riprap, where it was not always possible to overlap the two data-collection procedures.

The manufacturer states that the accuracy of the Mini-Ranger III system is  $\pm 3$  m ( $\pm 9.8$  ft). The system has a maximum range of 37 km (22 mi). The Mini-Ranger used in this study was capable of operating to a minimum distance of 10 m (32.8 ft) between the transponder and transceiver.

---

<sup>1</sup>Note: Use of specific product names in this report is for informational purposes only and does not constitute endorsement by the Illinois State Geological Survey.







**Figure 4** ISGS survey boat with survey gear installed. Mini-Ranger transceiver is mounted on the mast below the flag and is connected to the console (blue box on board). The fathometer is located beneath the Mini-Ranger console, with the transducer on a hinged wing at the port (left) side, which permits lowering for survey and raising for transport and storage (photo date: June 16, 1994).



**Figure 5** ISGS transit set up on control point for the profile line. The transit is oriented along the profile line, and the transit operator is keeping the survey boat on line by communicating with a hand-held radio. The white box is the Mini-Ranger transponder (photo date: June 15, 1994).







**Figure 6** ISGS survey boat navigating toward the shore along a profile line. The orange cone at water's edge forms a range with the transit to permit the coxswain to maintain boat position along the profile line. The box on the mast is the Mini-Ranger transceiver (photo date: June 15, 1994).

#### **Fathometer Survey Coverage**

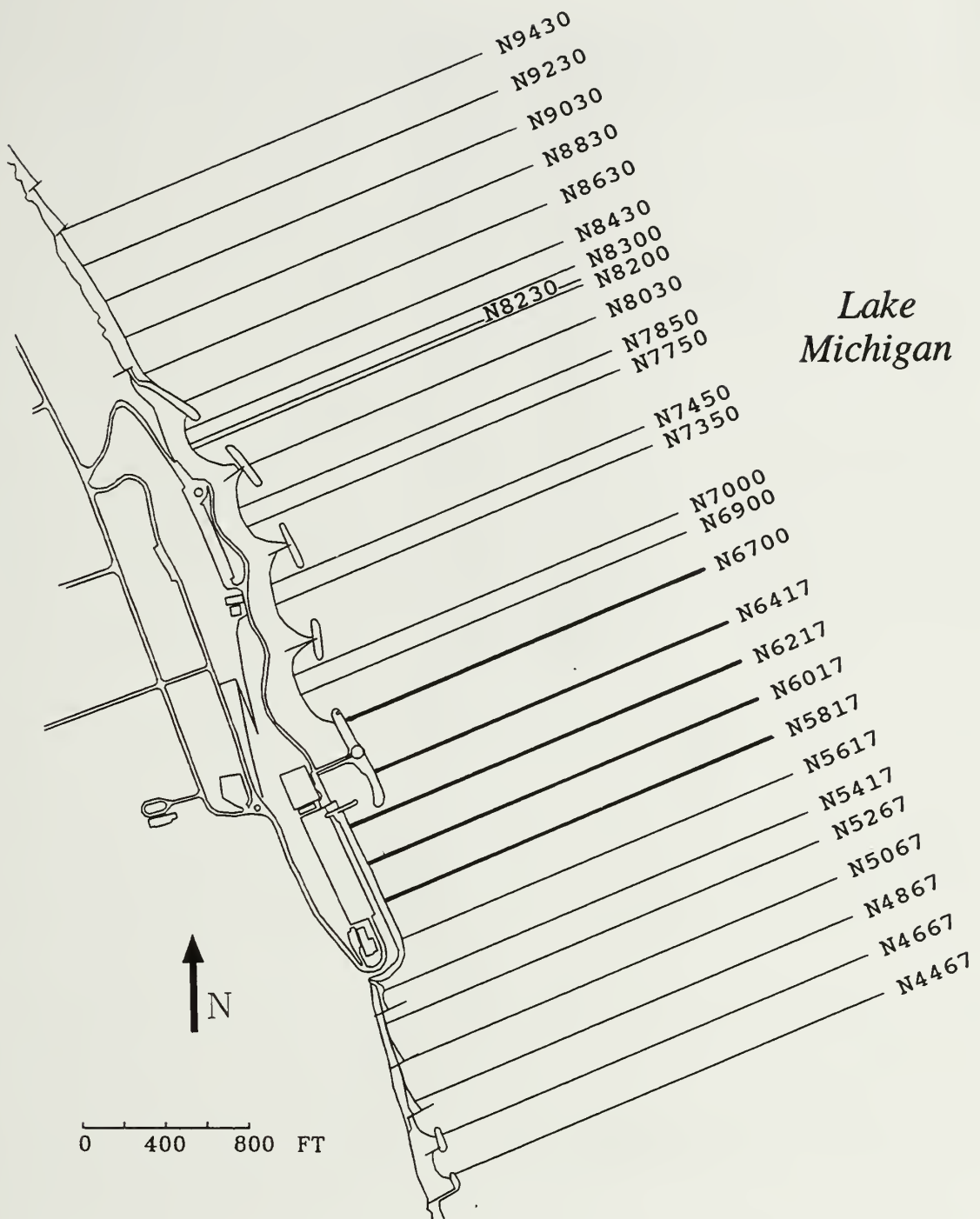
The 1994 fathometer surveys by the ISGS covered all of the so-called "long profiles" established in 1991 by CH2M HILL for this 5-year monitoring program. Fathometer data were also collected along each of two lines centered on each of the four beach cells. These fathometer profiles were gathered to enable comparison of these data with data from the City of Lake Forest along survey lines that extend lakeward of the breakwaters. Profile N6700 was also surveyed by the ISGS in 1994 to be able to compare it with the City's data for this profile, which is critical in determining the degree of bypass of sand past the deeper bathymetry detected in 1993 (Chrzastowski and Trask 1994) at the mouth of Beach Cell 4.

For consistency with the other fathometer profiles collected on the north and south sides of the project, these beach-cell fathometer lines were extended offshore to 800-900 m (2,625-2,950 ft). In the 1992 monitoring, the ISGS added four long lines to the survey scheme at 200-ft (61-m) line spacing northward from line N5617. These four additional lines (N5817, N6017, N6217, and N6417) were added to provide lake-bottom data lakeward of Breakwater I at the boat-launch basin and lakeward of the riprap-defended shore south of this basin. Sand bypassing the facility eventually has to cross this section of lake bottom. These lines were run in 1992 and 1993 by the ISGS and were repeated in 1994 by both the ISGS and the City of Lake Forest.

In total, fathometer data were collected by the ISGS along 28 profile lines. Figure 7 shows the locations and designations of these fathometer profiles. On the landward end of each of the fathometer profiles, there is overlap with profile data collected by wading in the nearshore with a prism pole, except for a few locations where overlap was not possible (such as on the lakeward margins of breakwaters).

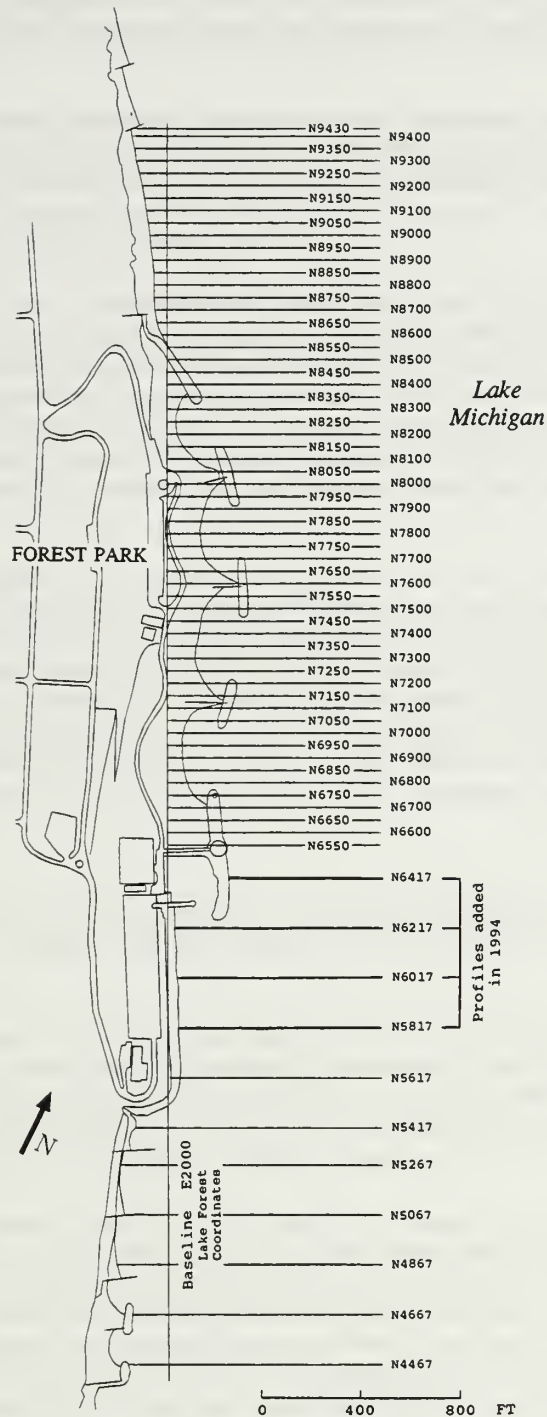
The City of Lake Forest surveyed a total of 70 profiles for a distance of 800 ft (244 m) lakeward of the E2000 baseline (fig. 8). During the 1994 monitoring, the City added the four new profiles at and south of Breakwaters I and II. Although profile N9430 was surveyed by the City, it was not reported, nor was it used for volume calculations (Magnus et al. 1994). However, data for this profile line were obtained from the City.





**Figure 7** Location and designation of fathometer profile lines surveyed by the ISGS during June, July, and August 1994. Heavier lines indicate profiles added by the ISGS (N6700) or the City of Lake Forest (N5817-N6417) during 1994.





**Figure 8** Location and designation of profiles surveyed by the City of Lake Forest in 1994. Profiles are numbered from south to north using northings based on the local Forest Park Beach coordinate system. The baseline of E 2000 was used as the origin of all profiles within the limits of the Forest Park Beach facility. North and south of the facility, all profiles were extended west beyond the E 2000 baseline to origins established on the beach in 1991.





Figure 8 shows the locations and designations of profiles run by the City of Lake Forest. Figure 9 identifies the profiles of the City of Lake Forest duplicated by the data collection of the ISGS.

### **Prism-Pole Surveys**

Prism-pole surveying refers to profiling across the beach and into the nearshore zone by two people—one holds a prism pole and advances in increments along the profile line, while the other shoots the position and elevation of the prism pole with a total station positioned at a bench mark in the project area to record position and elevation (fig. 10). Locations and elevations were referenced to a survey grid established by the City of Lake Forest during the 1991 monitoring (fig. 11).

The total station used by the ISGS was a Lietz/Sokkisha Set 4A with a Lietz SDR20 Electronic Field Book. All position and elevation data were recorded in the electronic field book attached to the total station. The person with the prism pole maintained position along the profile line by the alignment of onshore stakes, cones, or flags. Elevation measurements were normally made at horizontal intervals of approximately 5 to 15 ft (1.5 to 4.6 m). Smaller intervals were used to document notable changes in relief and bottom texture; longer intervals were used in areas with relatively continuous slope. The profiling was extended offshore to about a 5-ft (1.5-m) depth to permit overlap with the fathometer data. Use of a wet suit allowed prolonged stay in the water.

A prism-pole survey was conducted on the landward part of every long line. Thus, 28 prism-pole survey lines were completed. The prism-pole surveys originated at some fixed upland feature such as a curb or crest of riprap, or where possible on the bluff slope along the west side of the project. Positions and elevations were taken across any upland features (e.g., riprap, beach, or breakwater stone) and were generally continued into the shallow nearshore to a maximum depth of about 5 ft (1.5 m). An exception was at the outside edges of breakwaters where, for safety reasons, prism-pole surveying ended at the farthest lakeward point (usually a face stone) that could be reached while standing on the subaerial breakwater stones. Profiles resulting from the ISGS surveys, combining both fathometer and prism-pole data, are shown in Appendix B.

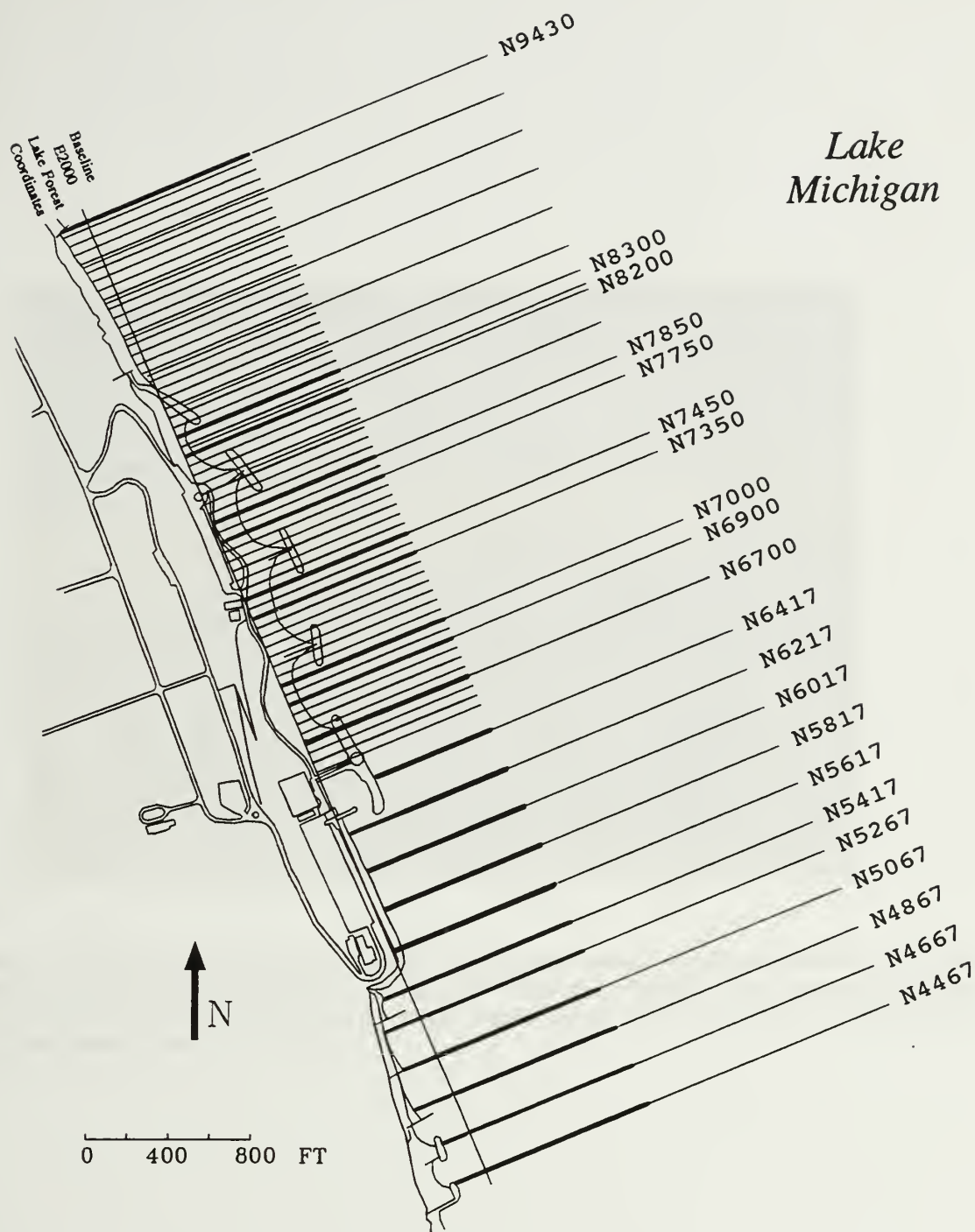
### **Field Schedule**

The ISGS collected 1994 beach and nearshore profile data at Forest Park Beach on June 14, 15, 16, 17, 20, and 21, July 18, and August 3 (table 2). Fathometer data were collected on June 14, 15, 16, and 17, and July 18.

Each of these days had calm water to minor wave activity. On June 14, no fathometer surveys were run during the afternoon because the calm morning conditions deteriorated to waves of 1 ft (0.3 m) or more. Waves on June 15 varied as the day progressed, ranging from calm in the morning to 0.5-1 ft (0.15-0.3 m) waves in the afternoon. On Thursday and Friday, June 16 and 17 and Monday, July 18, the lake was calm and glassy, permitting completion of all remaining fathometer profiles.

Prism-pole surveys were conducted on June 15, 17, 20, and 21. Although wave height was as much as 1 ft (0.3 m) during the surveys, the prism pole provides a direct measurement of lake-bottom elevation independent of any water level fluctuations. Beach Cell 4 was resurveyed on July 18 because it was discovered that stakes set by the City had been set at an angle to the intended profile line. This problem was compensated for by the City while running their prism-pole surveys, but it was not detected by the ISGS while fathometer surveys were being performed in June. The prism-pole surveys for lines N5417, N5617, N5817, N6017, and N6217 at the south end also had to be repeated on August 3 because data were lost while transferring them from the total station electronic notebook.





**Figure 9** Location and designation of 1994 profiles surveyed by the City of Lake Forest and duplicated (heavy lines and numbers) by the ISGS.





**Figure 10** ISGS prism-pole surveying operation. The person in the wet suit holds the prism pole, which is placed at locations along the profile line. The total station operator (on breakwater) gathers information on location and elevation by sighting on the prism. Waving of an orange flag signals completion of the survey point (photo date: June 17, 1994).





FOREST PART BEACH  
LAKE FOREST, ILLINOIS  
Survey Control Net

1. Brass cap in island.  
8,000 N  
2,000 E  
100 ft elev
2. Concrete nail in walk.  
7,532.79 N  
2,040.17 E  
98.39 ft elev
3. Brass cap on hill.  
7,124.16 N  
1,856.39 E  
108.15 ft elev
4. Concrete nail by dock.  
6,524.89 N  
1,980.31 E  
98.63 ft elev
5. Brass cap at sewer building.  
5,617.29 N  
2,000 E  
100.11 ft elev
6. Brass cap by flags.  
6,536.61 N  
2,216.15 E  
99.93 ft elev
7. 5,587.466 N  
1,998.631 E



**Figure 11** Survey control points used to establish profile locations and azimuths during the 1994 monitoring. This survey grid was first established for the 1991 monitoring and has been used in each successive year.



**Table 2** 1994 daily data collection by the Illinois State Geological Survey.

Date	Operation	Lines surveyed
June 14	Fathometer survey of long lines at south end.	N4467, N4667
June 15	Fathometer survey of long lines from Beach Cell 4 south; prism-pole survey of southern two profiles.	N4467, N4667, N4867, N5067, N5267, N5417, N5617, N5817, N6017, N6217, N6417, N6900, N7000
June 16	Fathometer survey of long lines from Beach Cell 3 to northern limit of monitoring area.	N7350, N7450, N7750, N7850, N8030, N8200, N8230, N8300, N8430, N8630, N8830, N9030, N9230, N9430
June 17	Fathometer survey of Beach Cells 2 and 3; prism-pole survey from Beach Cell 2 to north limit of monitoring area.	N7350, N7450, N7750, N7850, N8030, N8200, N8230, N8300, N8430, N8630, N8830, N9030, N9230, N9430
June 20	Prism-pole survey of south end.	N4867, N5067, N5267, N5417, N5617, N5817, N6017, N6217
June 21	Prism-pole survey of Boat Harbor, Beach Cell 4, and south end.	N4867, N5067, N5267, N6417, N6700, N6900, N7000
July 18	Fathometer and prism-pole resurvey of Beach Cell 4.	N6700, N6900, N7000
August 3	Prism-pole resurvey of south end.	N5417, N5617, N5817, N6017, N6217

## ISGS DATA PROCESSING

Depths on the fathometer traces were tabulated at 5-m (16-ft) horizontal increments (thus at each sequential 10-m vertical mark and midway between these marks). Additional depth/distance points were interpolated for prominent features occurring between these 5-m (16-ft) increments. Because of the swell and wave conditions during the survey operation, it was necessary to draw a smooth line through some of the fathometer traces from which to measure the depths. Photo-reduced reproductions of these fathometer traces are included in Appendix A. The distances were referenced to the coordinates of the profile control point (the Mini-Ranger station) and converted to both Illinois state plane coordinates and the local coordinates of the City of Lake Forest survey grid.

All depths from the fathometer traces were first corrected to Lakes Michigan-Huron Low Water Datum (LWD). This correction involved a depth adjustment based on the average of hourly lake levels recorded by the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), at Calumet Harbor, Illinois (Gauge No. 7044) and Milwaukee, Wisconsin (Gauge No. 7057). The data were subsequently adjusted to Lake Forest Datum (LFD) by subtracting 2.06 ft (0.63 m) from the LWD depths. The profile data collected with a prism pole were measurements of lake-bottom elevations relative to the elevation of the brass cap or concrete nail to which the total station was referenced. These data were adjusted to LFD by subtracting the LFD elevation of the appropriate brass cap or chisel mark from the elevation of the surveyed points.



Table 3 shows hourly Calumet Harbor and Milwaukee lake-level elevations for the fathometer survey dates in June and July 1994. The mean correction to LFD (determined by averaging the water levels of the two gauges) is the correction factor that was subtracted from the raw fathometer depth data to reduce depths to LFD. For all five dates during the hours of fathometer operations, there was excellent agreement in lake level at the Calumet and Milwaukee gauges. The greatest difference was 0.52 ft (0.16 m) at 1100 hours on June 14. The overall agreement between the two lake-level gauges attests to a lack of any lake level set-up, seiches, or regional fluctuations along this segment of the western lakeshore at the time of the surveys. However, the differences that do exist indicate how lake-level oscillations can cause dissimilarities in lake levels, as measured at these two separate sites. This can account for differences that may exist between profiles measured by the City with a total station and prism pole, measurements not effected by changes in lake level, and profiles measured by the ISGS with a fathometer, measurements that are dependent on lake level at the time of surveying.

The X-Y-Z data of position and LFD-corrected depth were plotted as profiles using the ARC/INFO Geographic Information System (GIS). The profiles were drawn to the same scale, format, and vertical exaggeration (10x) as the City of Lake Forest report to facilitate comparisons. The fathometer (long) profiles with their beach/nearshore prism-pole components are given in Appendix B.

**Table 3** Lake levels in feet above given datum at Calumet Harbor, Illinois, and Milwaukee, Wisconsin (lake-level data from NOAA-NOS).

Hours CST	Calumet Harbor, Illinois		Milwaukee, Wisconsin		Calumet/ Milwaukee Lake Level Difference	Mean Correction to LWD	Mean Correction to LFD
	LWD	LFD	LWD	LFD			
June 14, 1994							
0900	2.67	0.61	2.53	0.47	0.14	2.60	0.54
1000	2.37	0.31	2.80	0.74	0.43	2.58	0.52
1100	2.80	0.74	2.28	0.22	0.52	2.54	0.48
June 15, 1994							
0700	2.53	0.47	2.52	0.46	0.01	2.53	0.47
0800	2.33	0.27	2.66	0.60	0.33	2.50	0.44
0900	2.35	0.29	2.48	0.42	0.13	2.42	0.36
1000	2.27	0.21	2.74	0.68	0.47	2.51	0.45
1100	2.57	0.51	2.52	0.46	0.05	2.55	0.49
1200	2.46	0.40	2.69	0.63	0.23	2.57	0.51
1300	2.50	0.44	2.49	0.43	0.01	2.50	0.44





**Table 3** Lake levels in feet above given datum at Calumet Harbor, Illinois, and Milwaukee, Wisconsin (lake-level data from NOAA-NOS).

Hours CST	Calumet Harbor, Illinois		Milwaukee, Wisconsin		Calumet/ Milwaukee Lake Level Difference	Mean Correction to LWD	Mean Correction to LFD
	LWD	LFD	LWD	LFD			
June 15, 1994 (continued)							
1400	2.56	0.50	2.65	0.59	0.09	2.61	0.55
June 16, 1993							
1000	2.17	0.11	2.58	0.52	0.41	2.37	0.31
1100	2.38	0.32	2.38	0.32	0.00	2.38	0.32
1200	2.40	0.34	2.54	0.48	0.14	2.47	0.41
1300	2.39	0.33	2.48	0.42	0.09	2.44	0.38
1400	2.52	0.46	2.59	0.53	0.07	2.56	0.50
1500	2.50	0.44	2.52	0.46	0.02	2.51	0.45
1600	2.41	0.35	2.57	0.51	0.16	2.49	0.43
1700	2.61	0.55	2.53	0.47	0.08	2.57	0.51
1800	2.55	0.49	2.51	0.45	0.04	2.53	0.47
July 18, 1994							
1000	2.78	0.72	2.88	0.82	0.10	2.83	0.77
1100	2.73	0.67	2.80	0.74	0.07	2.77	0.71

## REVIEW OF THE CITY OF LAKE FOREST PROFILING PROCEDURES AND SURVEY GRID

During June 1994, the ISGS monitored the City of Lake Forest field procedures and operations. Operations monitored included the surveying to establish horizontal control points onshore along the profile lines and the profiling across the beach and nearshore. Profile locations were established using the control points shown in figure 11. The City followed all standard field procedures for such a survey. The City contracted with Manhard Consulting to perform the survey necessary to set up the profile lines and to operate the total station during profiling operations. All procedures followed accepted surveying practices.

Locations of profiles surveyed by the ISGS were independently verified using a prism pole and total station. The X-Y-Z coordinates determined by Manhard Consulting for the City of Lake Forest were replicated by the ISGS.



### **Beach Profiling**

The 1994 profiling conducted by the City of Lake Forest was done entirely with a total station and prism pole in the same way that the City collected data in 1992 and 1993. The total station was set up at one of the established brass caps or chisel marks along the park property. The prism pole was moved along each of the profile lines. Data for X and Y (location) and Z (elevation) were recorded at each shot point in an electronic notebook attached to the total station. For profiling across the beach, over breakwaters, and into the water within several feet of the shoreline, a member of the survey team carried the prism pole.

### **Nearshore Profiling**

The 1994 nearshore profiling conducted by the City of Lake Forest involved two boats and a tether line that extended from the shore to the lakeward limit of surveying. This line was held by an anchor or a spike at its shore end and by a boat at the lakeward end. The boat was kept at idle speed in reverse gear to hold the line taut (fig. 12). Onshore range markers allowed the boat operator to keep the tether line positioned along the desired profile. A second boat was yoked to the tether line and a crew member pulled this boat along the tether, stopping at premarked 20-ft (6-m) intervals. At each stop a crew member of this second boat placed the foot of the prism pole on the lake bottom and signaled the total-station operator to make a shot (fig. 13). After recording the location and elevation, the total-station operator signaled the boat to move to the next shot point. Data collection could proceed with successive points being shot in either landward or lakeward direction. In order to work in water deeper than the maximum extension of a standard prism pole, the prism was mounted atop a 20-ft (6-m) telescoping surveyor's rod.

### **General Statement on City of lake Forest Profiling Procedures**

The profiling procedure used by the City of Lake Forest is one of the most accurate ways of collecting profile data. The fathometer technique can provide an independent check on these data, but the prism-pole data are preferred because of greater accuracy in terms of location (X, Y data) and elevation (Z data). This comparison of prism-pole and fathometer techniques was discussed in detail in the ISGS report on the 1992 monitoring (Trask and Chrzastowski 1993).

## **COMPARISON OF ISGS AND CITY OF LAKE FOREST PROFILES**

Twenty-one of the profiles surveyed by the City of Lake Forest were also surveyed by the ISGS. Nine of these profiles are from the beach cells, and the remaining 12 are the long profiles from north and south of the Forest Park Beach project.

### **Comparison Summary**

Comparisons of profiles surveyed by the ISGS and the City of Lake Forest (Appendix C) generally show excellent agreement in spite of the differences in the methods of data collection. Differences occurring in the profile comparisons were assigned to three categories by Chrzastowski and Trask (1994):

- spurious points,
- profile vertical displacement, and
- profile discrepancies at revetments and breakwaters.

**Spurious points** Spurious points refer to depth values that are anomalously high or low compared with adjacent points and are thus inconsistent with the overall surface trend determined by nearby points. No spurious points were detected in the comparison of 1994 profiles. An apparent spurious point in ISGS data in profile N9430 at a local easting of about 1875 ft reflects the presence of a groin in the profile line.

**Profile vertical displacement** Profile vertical displacement refers to a condition in which segments or a major part of the two profiles are symmetric, with equivalent hummocks and troughs and overall shape, but with a rather uniform vertical offset, one above another. Such a vertical displacement occurs along the nearshore end of the fathometer sections of profiles N4667 and N8300, near the center of profiles N7000 and N8200, and throughout the fathometer section of profile N9430. In all cases, the ISGS profile line is about 1.0 to 1.3 ft (0.3 to 0.4 m) below the City of Lake Forest profile line, except for profile N4667 where the ISGS profile line lies above the City of Lake Forest profile line.







**Figure 12** City of Lake Forest profiling operations. A tether line is anchored on shore along a profile line and pulled taught by a boat at the offshore end. Prism-pole measurements are made from a second boat that moves along the tether line (photo date: June 19, 1994).



**Figure 13** City of Lake Forest small boat; the person is holding the prism pole for elevation measurements at 20-ft (6-m) intervals marked on the tether line. Note the tether line extending left and right over the bow and stern of the boat (photo date: June 19, 1994).





The vertical displacement suggests a systematic error in one of the data sets. The prism-pole data collected by the City of Lake Forest are a direct measure of lake-bottom elevations, independent of any corrections for lake level or waves. Such corrections are necessary for the fathometer data. The profile vertical displacement is interpreted as resulting from the ISGS fathometer data being adjusted by a lake-level correction that did not accurately bring the data to the Lake Forest Datum. Because the ISGS data generally fall below the City of Lake Forest data, this condition could have arisen if there had been a localized and short-lived fall in lake level while these profile lines were being surveyed. The ISGS profile line that falls above the City of Lake Forest profile line indicates a short-lived rise in lake level. This is one of the potential problems in collection of fathometer data as opposed to prism-pole measurements. The symmetry of the two data sets confirms the reproducibility of the data collection by the City of Lake Forest.

Another possible source of error in comparison of profiles in beach cells is change of beach profile by grading operations. Frequently in the morning prior to opening of the beach area, the City smooths the beach using a loader dragging a log (fig. 14). However, as shown by the comparisons of beach profiles (N6700, N6900, N7000, N7350, N7450, N7750, N7850, N8200, and N8300), this operation had little to no effect on overall profile character. This is because, as shown in figure 14, little sand is moved by this operation. Perhaps the difference of as much as 1.3 ft (0.4 m) in profile N6700 on the landward side of the breakwater is a result of this grading. The sand in this area is finer and more easily moved.



**Figure 14** City of Lake Forest loader grading the beach in Beach Cell 4. The beaches are often graded in the morning by dragging the bucket of the loader and a log across the surface to smooth irregularities caused by the previous day's recreational activities or by high wave activity (photo date: June 17, 1994).



**Profile discrepancies at revetments and breakwaters** In comparing two sets of profile data along the same profile line, it is difficult to get agreement in profile data over the exposed parts of rubble-mound revetments and breakwaters because, unless the exact same points on the breakwater stones are surveyed, significant differences in elevation may occur. Discrepancies occur in the City of Lake Forest and ISGS data sets where profiles cross over breakwaters in profiles N4667, N5417, N5617, N5817, N6017, N6417, and N6700. These are the most substantial discrepancies occurring in any of the profile comparisons. The discrepancies are not errors, but differences in the number and location of survey points atop the breakwater stone.

Although the profile data atop breakwaters do not apply to the concerns of sand accretion or erosion at the project, development of the best possible data set will require some additional effort by the City of Lake Forest to acquire more data points when crossing the breakwaters and riprap. In profiles N4667 and N6700, it can be seen that the greater number of points and more careful point selection in the ISGS profiles result in a more detailed documentation of elevation and slope across breakwaters and revetments.

Discrepancies can also occur in the underwater part of profiles near breakwaters if a submerged rock is recorded in the points of one data set but not the other. An example occurs in profile N6417 at the local easting of about 2020 ft. The high elevations recorded by the ISGS are apparently atop a submerged stone or stones on the lakeward side of Breakwater I. A similar example is in profile N5817 at an easting of about 2050 ft. This problem has an effect on the determination of erosion and accretion where interpolation between widely spaced survey points may cause an apparent shallowing of bathymetry as in Profile N5617 between eastings 2050 and 2100 ft.

In making annual comparisons of profile change near the breakwaters and riprap, it is important to scrutinize the data to identify if submerged breakwater stones may be included one year but not another. If this does occur, interpretations of lake-bottom accretion or erosion should be carefully examined to ensure that such changes are not due to prism-pole placement.

### **Conclusion**

Discrepancies occur in some common segments of the two profile data sets collected in 1994, but these can be explained by lake-level corrections or differences in the number and location of points across riprap or breakwater stones.

Sufficient comparison data are available for us to conclude that the profile data collected in 1994 by the City of Lake Forest are reproducible. Thus, the profile data are verified. These data can be compared with data from 1993, 1992, 1991, and earlier surveys, as well as with data to be collected during the remaining fifth year of the monitoring program.

## **AREAL AND VOLUMETRIC TRENDS IN ACCRETION AND EROSION**

In this section, the bathymetric maps compiled from the 1993 and 1994 data are compared to determine accretion or erosion across the mapped area over the 1-year period since the 1993 monitoring was conducted. The ISGS used its GIS system (ARC/INFO) to perform this comparison.

### **Bathymetric/Topographic Maps**

Maps of bathymetry and beach topography were constructed from a combination of City of Lake Forest and ISGS data. Data collected by the City had precedence and were used for those areas where the City conducted prism-pole surveys. Only ISGS data were available for lakeward of these areas and for the boat basin. The bathymetric maps at a scale of 1:4,800 are shown in figures 15 (1993) and 16 (1994). Enlargements of the beach topography and nearshore bathymetry for the beach cells are shown at a scale of 1:2,400 in figures 17 (1993) and 18 (1994). These larger scale maps are presented, as in past years, to provide detail of beach topography not shown on the smaller scale maps.

Data collected by the City of Lake Forest were used to construct those parts of the maps from the concrete wall or other landward-most point at the head of the beach to a distance 800 ft (244 m) lakeward of the







# FOREST PARK BEACH LAKE FOREST, ILLINOIS

## Nearshore Bathymetry

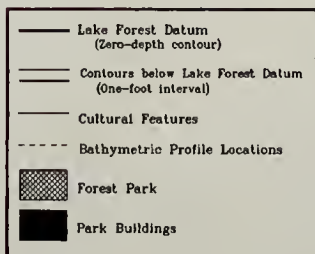
Collected by City of Lake Forest  
June, July, and August 1993

and

Illinois State Geological Survey  
June 1993



LAKE  
MICHIGAN



Lambert Conformal Conic Projection Based on Standard Parallels 33 and 45

Illinois State Geological Survey  
Lakes, Streams, and Wetlands Unit

Figure 15 1993 nearshore bathymetry of the Forest Park Beach area contoured by the ISGS from profile data collected by the City of Lake Forest in June, July, and August 1993 and the ISGS in June 1993.





# FOREST PARK BEACH LAKE FOREST, ILLINOIS

Nearshore Bathymetry

Collected by City of Lake Forest

June 1994

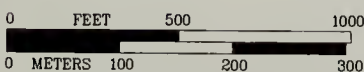
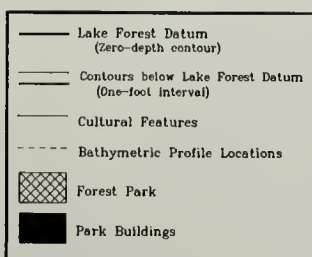
and

Illinois State Geological Survey

June, July, and August 1994



LAKE  
MICHIGAN



Lambert Conformal Conic Projection Based on Standard Parallels 33 and 45

Illinois State Geological Survey  
Lakes, Streams, and Wetlands Unit

Figure 16 1994 nearshore bathymetry of the Forest Park Beach area contoured by the ISGS from profile data collected by the City of Lake Forest in June 1994 and the ISGS in June, July, and August 1994.



# FOREST PARK BEACH LAKE FOREST, ILLINOIS

Nearshore Bathymetry  
and

Beach Topography

Collected by City of Lake Forest

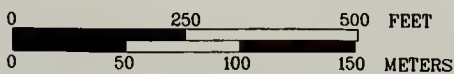
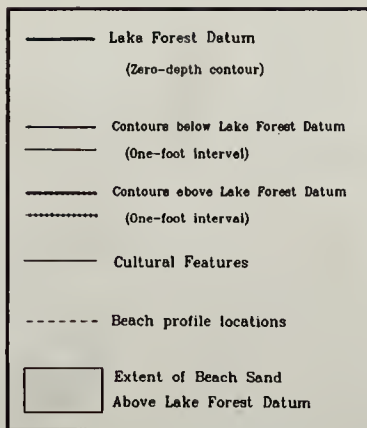
June, July, and August 1993

and Illinois State Geological Survey

June 1993



LAKE  
MICHIGAN



Lambert Conformal Conic Projection Based on Standard Parallels 33 and 45

Illinois State Geological Survey

Lakes, Streams, and Wetlands Unit

Figure 17 1993 nearshore bathymetry and beach topography of Forest Park Beach contoured by the ISGS from profile data collected by the City of Lake Forest in June, July, and August 1993. This map differs from figure 15, in that it is a larger scale and contains beach topography.





# FOREST PARK BEACH LAKE FOREST, ILLINOIS

Nearshore Bathymetry  
and

Beach Topography

Collected by City of Lake Forest

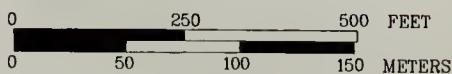
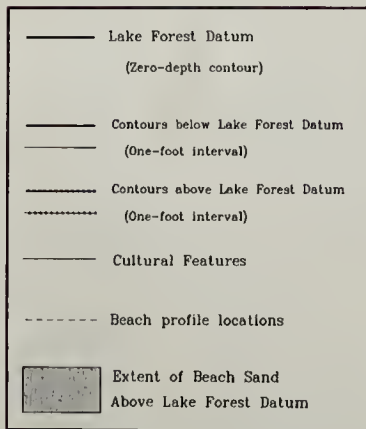
June 1994

and Illinois State Geological Survey

June, July, and August 1994



LAKE  
MICHIGAN



Lambert Conformal Conic Projection Based on Standard Parallels 33 and 45

Illinois State Geological Survey

Lakes, Streams, and Wetlands Unit

Figure 18 1994 nearshore bathymetry and beach topography of Forest Park Beach contoured by the ISGS from profile data collected by the City of Lake Forest in June 1994. This map differs from figure 16, in that it is a larger scale and contains beach topography.



2,000-ft baseline; this 800-ft distance is the lakeward limit of the City's data. Outside this limit, ISGS long-profile data were used to construct the maps. Locally, ISGS wading profiles were used landward of the City's data to contour beach topography. The ISGS established and surveyed four additional lines between profile N5617 and the boat basin (profiles N5817 to N6417; see fig. 7) in 1992 and 1993 to provide data for this part of the project. In 1994, the City of Lake Forest also surveyed these profiles. Thus, it was not necessary to use ISGS data in this area to map the nearshore bathymetry in 1994.

In a pocket at the back of this report is a 1994 bathymetric/beach-topography map (plate 1). It is at a scale of 1:1,200 and shows all data points from the 1994 surveys and the contours drawn at a 1-ft interval using these data points. Only City of Lake Forest data are shown along profile segments where both ISGS and City data were collected. The 1-ft contours are the same as those presented in the page-size maps in figures 16 and 18. This 1:1,200-scale map is provided as a base map for future data comparisons. A similar map was prepared by the ISGS for the 1992 data (Trask and Chrzastowski 1993) and the 1993 data (Chrzastowski and Trask 1994).

### **Beach and Nearshore Change Map**

The 1993 and 1994 maps of beach topography and nearshore bathymetry were compared, using the triangulated irregular network (TIN) procedure, and a map was generated showing changes in beach topography and nearshore lake-bottom bathymetry that took place during this 1-year interval. The procedure is discussed by Trask and Chrzastowski (1993). Detailed procedures for working with TIN are provided in the ARC/INFO User's Guide for Surface Modeling with TIN (Environmental Systems Research Institute, Inc. 1991). A modification to this procedure was made for the area of Breakwaters I, II, and III. As noted by Chrzastowski and Trask (1994), an area of deep bathymetry opposite Beach Cell 4 was preventing development of bypass in this area. During the 1994 monitoring in this area, the City of Lake Forest documented a lakeward excursion of the sand/clay interface to a depth of 15 ft; elsewhere, the 12-ft contour approximated the sand/clay interface. Therefore, rather than delete 1 ft or less accretion and erosion outside of the 12-ft depth, all accretion and erosion was documented here to a depth of 15 ft.

The 1993-1994 beach and nearshore change map is shown in figure 19 at a scale of 1:4,800. This map shows only those areas where accretion or erosion is greater than 1 ft (0.3 m). This 1-ft datum or threshold for depicting areas of gain or loss thus focuses on the areas of major change and ignores any change of less than 1-ft. It is apparent from the map that accretion was the major change from 1993 to 1994.

At the 1-ft threshold, accretion in the monitoring area was focused in four major zones. The largest patches of accretion were in the updrift bar, at the north side of Breakwater V (Beach Cell 1), offshore of Beach Cell 4, lakeward of Breakwater II, and in the groin field south of the project. The accretion in the nearshore bar and Beach Cell 1 can be seen in a low oblique aerial photograph (fig. 20). Accretion in the groin field is probably a result of both natural bypass of the project and nourishment emplaced by the City following the 1993 monitoring. Other patchy areas of accretion occur in the fillet beach and north side of Breakwater VI, at the north end of Breakwater IV (entrance to Beach Cell 2), at the north end and landward side of Breakwater III, in the southern part of Beach Cell 4, and in small areas lakeward of the breakwaters and riprap.

Erosion occurred along the lakeward margin of Breakwaters III and IV and in the southern part of Beach Cell 4. Apparent erosion on the lakeward side of Breakwaters I and II may be a result of different toe and face stones surveyed during 1994, as compared with 1993.

### **Volumetric Changes, 1993-1994**

Volumetric changes for the 1-year interval from 1993 to 1994 were computed for the City of Lake Forest by the firm W. F. Baird & Associates (1994). The ISGS also performed a volumetric analysis for comparison. The procedures used by Baird & Associates and the ISGS were similar, both using a TIN procedure to compare surfaces defined by the two data sets. Several differences occur in the two analyses.

1. Baird & Associates used the 1993 or 1994 sand/clay interface as a boundary in defining areas for volume calculations; the one selected was the one that was located the farthest east (lakeward). The ISGS used



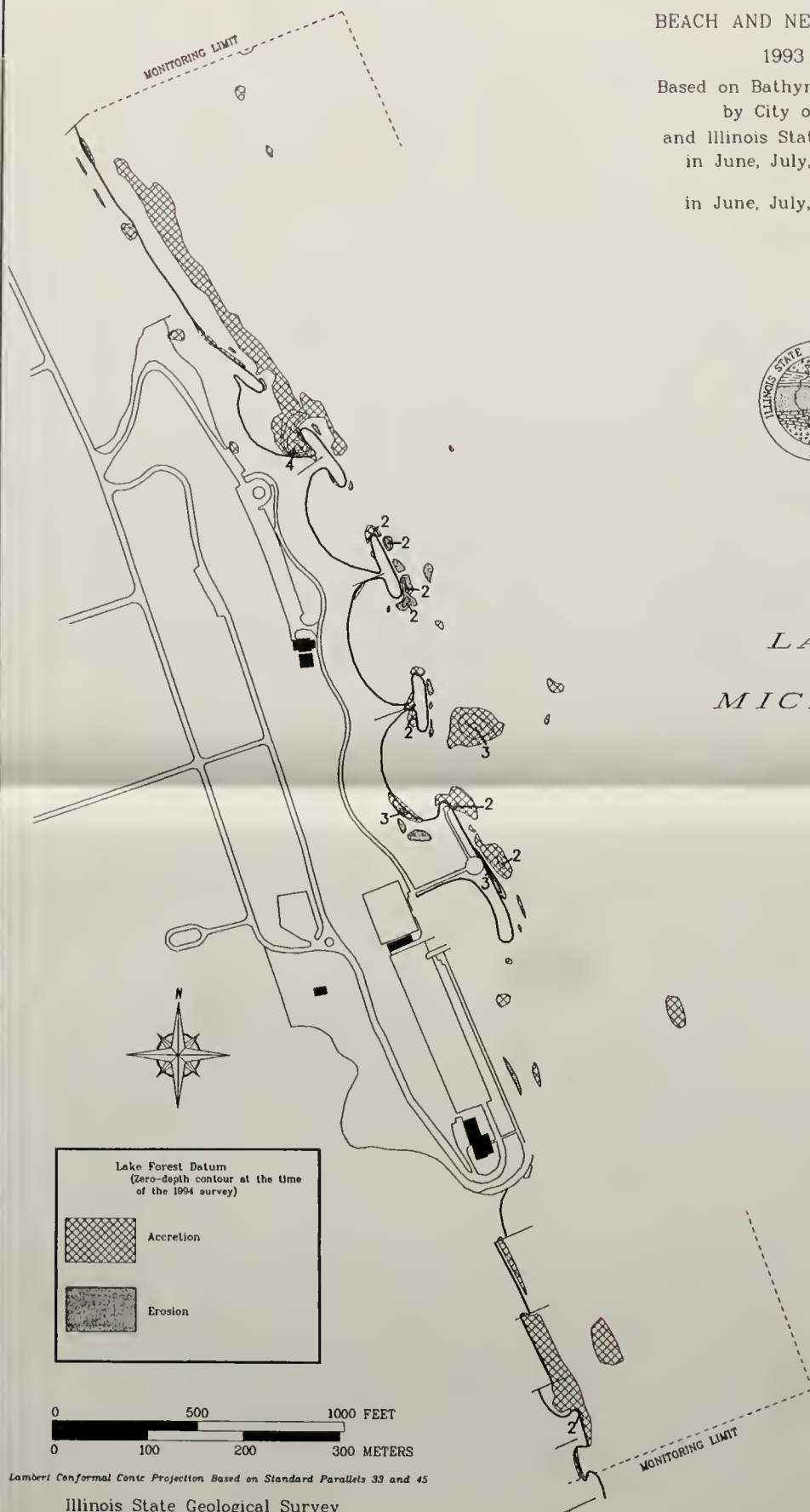


FOREST PARK BEACH  
LAKE FOREST, ILLINOIS  
BEACH AND NEARSHORE CHANGES  
1993 TO 1994

Based on Bathymetric Data Collected  
by City of Lake Forest  
and Illinois State Geological Survey  
in June, July, and August 1993  
and  
in June, July, and August 1994



LAKE  
MICHIGAN



Lambert Conformal Conic Projection Based on Standard Parallels 33 and 45

Illinois State Geological Survey  
Lakes, Streams, and Wetlands Unit

Figure 19 Beach and nearshore changes, from 1993 to 1994. Only those changes greater than 1 ft are shown.





**Figure 20** North end of Forest Park Beach, including Breakwaters V (left) and VI (right) and Beach Cells 1 (center) and 2 (far left). The fillet beach at the north (right) side of Breakwater VI has partially covered the shore-attached end of the breakwater. The nearshore bar and sand/clay interface can be seen lakeward of the fillet beach and Breakwater VI (photo date: June 21, 1994).

the 1994 15-ft contour as a boundary or the 12-ft contour where the interface was closer to shore. Within the monitoring area, these contours and the interface approximate each other. This was not, therefore, considered a significant difference in procedures.

2. Baird & Associates computed volumes of change lakeward of the sand/clay interface. The ISGS did not compute any changes lakeward of the 15-ft contour and attempted to confine all calculations to the area where the nearshore lake bottom is covered by sand. Placement of the prism pole on a boulder protruding as much as 1 ft (0.3 m) from the lake floor could imply significant accretion or erosion where none has occurred.

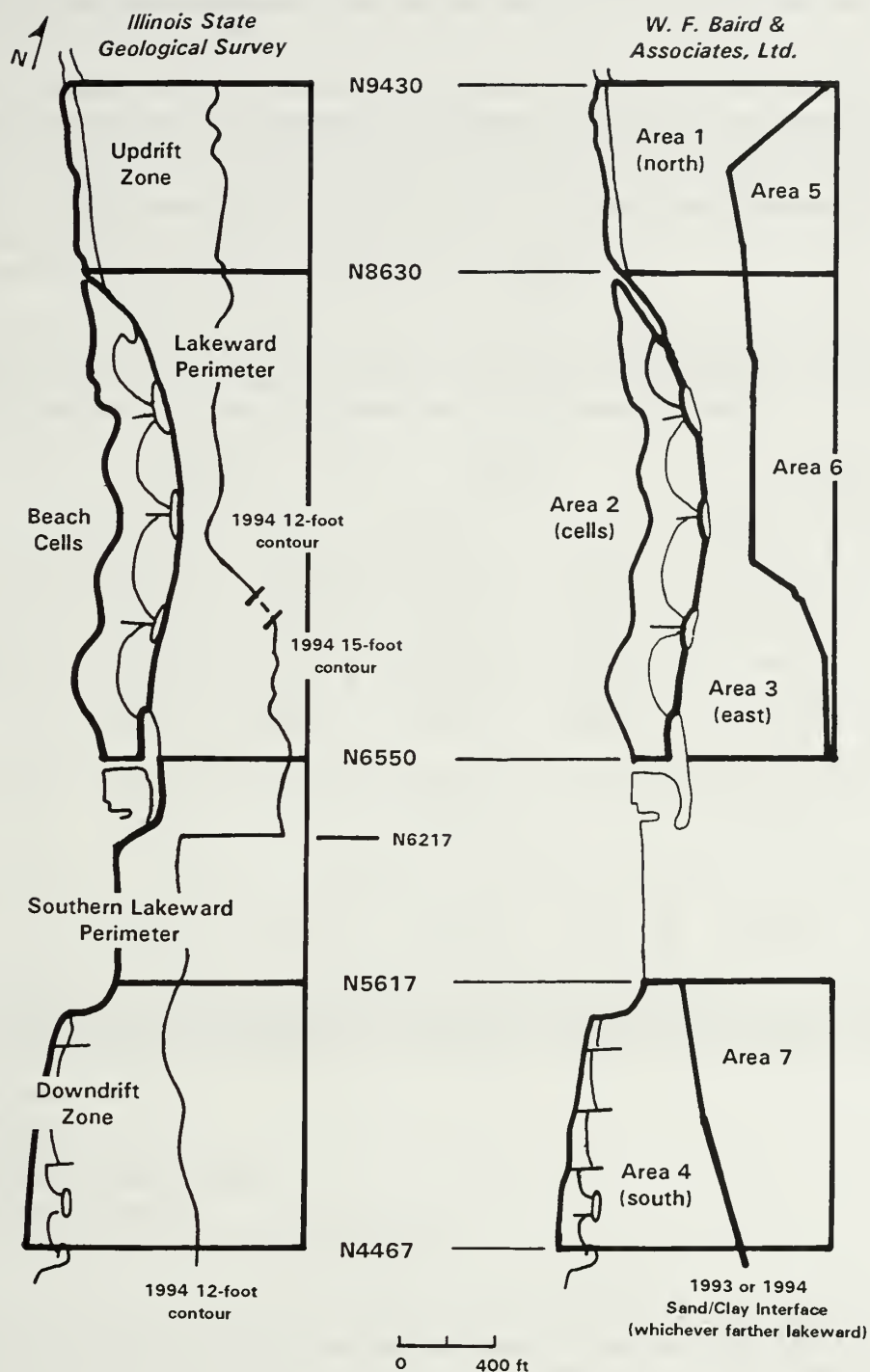
3. The ISGS used its 1993 data and the City's 1994 data to compute volume changes lakeward of the southern part of Forest Park Beach (between profiles N5617 and N6550). This area was not included in the analysis by Baird & Associates because the City did not collect data from this area in 1993. This will be an area of significant accretion when bypass occurs.

4. The ISGS contoured the data by hand prior to the TIN analysis. Baird & Associates performed the TIN on raw data. It is not known if these two different techniques contribute significantly different results to the analysis.

The City of Lake Forest has divided Forest Park Beach into seven areas (fig. 21) for consideration of accretion and erosion (Baird & Associates 1994). In this report, the same five areas of Trask and Chrzastowski (1993) and Chrzastowski and Trask (1994) are used. The areas are the Updrift Zone (Lake Forest areas 1 and 5), the Beach Cells (Lake Forest area 2), the Lakeward Perimeter (Lake Forest areas 3 and 6), the Southern Lakeward Perimeter (not mapped by the City of Lake Forest), and the Downdrift







**Figure 21** Zones of the monitoring area, as defined by the ISGS and by W.F. Baird & Associates, for calculation of 1993-1994 volumetric changes.



Zone (Lake Forest areas 4 and 7). For the 1993 monitoring, Lake Forest areas 5, 6, and 7 consisted of those portions of the ISGS zones that were lakeward of the 1992 sand-clay interface (Baird & Associates 1993b). In 1994, the boundary was selected as the sand/clay interface from 1993 or 1994, whichever was farther east (Baird & Associates 1994).

Table 4 shows the volumes of material accreted to or eroded from each of these five areas from 1993 to 1994. In reports of the 1991 and 1992 monitoring, the ISGS used a 1-ft threshold; all erosion or accretion less than 1 ft was considered to be within the range of potential procedural error because the data were primarily from fathometer records, which are less accurate than prism-pole readings. The 1992-1993 comparison was of equivalent prism-pole data sets, and thus a zero threshold was considered appropriate (Chrastowski and Trask 1994). Similarly, comparison of volume and erosion for the 1994 data set uses the 0-ft cutoff as does the City of Lake Forest (Magnus et al. 1994).

<b>Table 4 Comparison of the ISGS accretion and erosion calculations with those performed by the City of Lake Forest during the 1994 monitoring season. All monitoring areas of the City are included. The threshold is 0 ft; units are cu yd. Calculations are rounded to the nearest 100 cu yd.</b>						
Zone	Accretion		Erosion		Net change	
	ISGS	City	ISGS	City	ISGS	City
Updrift Zone <sup>1</sup>	9,600	9,400	800	1,600	+8,800	+7,800
Beach Cells <sup>2</sup>	6,100	3,000	1,500	1,700	+4,600	+1,300
Lakeward Perimeter <sup>3</sup>	11,200	16,700	1,600	2,200	+9,600	+14,500
Southern Lakeward Perimeter <sup>4</sup>	7,000	—	600	—	+6,400	—
Downdrift Zone <sup>5</sup>	10,400	17,700	600	900	+9,800	+16,800
Total <sup>6</sup>	37,300	46,800	4,500	6,400	+32,800	+40,400
<sup>1</sup> Lake Forest areas 1 and 5. <sup>2</sup> Lake Forest area 2. <sup>3</sup> Lake Forest areas 3 and 6. <sup>4</sup> Not mapped by Lake Forest in 1993. <sup>5</sup> Lake Forest areas 4 and 7. <sup>6</sup> Total does not include Southern Lakeward Perimeter.						

ISGS volume calculations for several different thresholds (0, 0.5, 1.0, etc.) are included in Appendix D. Table 4 compares the ISGS calculations with the total volume calculations of the City of Lake Forest (prepared by W. F. Baird & Associates, 1994). Comparison of the gross and net changes range from good (accretion in the Updrift Zone) to poor (net change in the Lakeward Perimeter and Downdrift Zone). However, areas 5, 6, and 7, for which the city computed accretion and erosion and which are included in table 4, are located lakeward of the sand-clay interface and lakeward of the ISGS zones. Calculations of accretion and erosion in this area consider changes in the clay-bottomed lake floor lakeward of the sand prism; such calculations may reflect differences in placement of the prism pole in this part of the monitoring



area and not actual accretion or erosion. As is also the case with placement of the survey point, placement of the prism pole on a boulder or series of boulders rather than the clay lake floor can cause measurement of apparent accretion lakeward of the sand/clay interface.

Table 5 is an alternate comparison of ISGS calculations with those of the City of Lake Forest without inclusion of City areas 5, 6, and 7. Agreement between the two calculations is much better in this comparison than it is in the previous one. In the Beach Cells, however, ISGS calculations are 3,300 cu yd (2,500 cu m) higher than the net accretion calculated by the City. Also, the ISGS calculations for the Lakeward Perimeter are 1,900 cu yd (1,500 cu m) more than the net accretion calculated by the City. This may be a result of two differences in mapping: (1) location of the boundary between the two areas and (2) mapping performed prior to calculating accretion and erosion.

**Table 5** Comparison of the ISGS accretion and erosion calculations with those performed by the City of Lake Forest during the 1994 monitoring season. Data from Lake Forest areas 5, 6, and 7 are not included. The threshold is 0 ft; units are cu yd. Calculations are rounded to the nearest 100 cu yd.

Zone	Accretion		Erosion		Net change	
	ISGS	City	ISGS	City	ISGS	City
Updrift Zone <sup>1</sup>	9,600	8,100	800	1,100	+8,800	+7,000
Beach Cells <sup>2</sup>	6,100	3,000	1,500	1,700	+4,600	+1,300
Lakeward Perimeter <sup>3</sup>	11,200	13,100	1,600	1,600	+9,600	+11,500
Southern Lakeward Perimeter <sup>4</sup>	7,000	—	600	—	+6,400	—
Downdrift Zone <sup>5</sup>	10,400	9,300	600	800	+9,800	+8,500
Total <sup>6</sup>	37,300	33,500	4,500	5,200	+32,800	+28,300

<sup>1</sup>Lake Forest area 1.

<sup>2</sup>Lake Forest area 2.

<sup>3</sup>Lake Forest area 3.

<sup>4</sup>Not mapped by Lake Forest in 1993.

<sup>5</sup>Lake Forest area 4.

<sup>6</sup>Total does not include Southern Lakeward Perimeter.

The City used a boundary between the Beach Cells and the Lakeward Perimeter of the half-way point between the inside and the outside of the breakwaters, thus splitting the breakwaters in half, with one-half considered to be in the Beach Cells and the other half in the Lakeward Perimeter. The ISGS, on the other hand, drew a line along the outside of the breakwaters. Thus, part of the area considered by the City to be in the Lakeward Perimeter was included in the Beach Cells by the ISGS.

The ISGS contoured the data by hand and removed any changes attributable to different survey points on the breakwaters and groins. The City calculated accretion and erosion from raw data (see Baird & Associates 1994) and may have included apparent accretion or erosion due to surveying of different points





in transects across the breakwaters or groins. For example, computer interpolation of a surface from a point on the nonaccretionary south side of a groin to a point north of the accretionary wedge on the north side of the groin may eliminate the accretionary area on the north side of the groin from consideration. By contouring the data prior to performing accretion/erosion calculations, the ISGS attempted to provide a reasonable geologic interpretation of conditions at the facility, including the step between the north and south sides of groins. The ISGS then compared the interpretation with a similar interpretation for the previous year's data.

Summarizing the comparison of table 5, the 1993-1994 net accretion and erosion in the Forest Park Beach monitoring area are as follows:

Net Accretion: 37,300 cu yd (28,500 cu m) calculated by the ISGS and 33,500 cu yd (25,600 cu m) calculated by the City. This is a difference of 10%. The ISGS calculated an additional 7,000 cu yd (5,400 cu m) of accretion in the Southern Lakeward Perimeter.

Net Erosion: 4,500 cu yd (3,400 cu m) calculated by the ISGS and 5,200 cu yd (4,000 cu m) calculated by the City. This is a difference of 16%. The ISGS calculated an additional 600 cu yd (500 cu m) of erosion in the Southern Lakeward Perimeter.

Summation of the 1993-1994 total accretion and erosion for the City of Lake Forest areas 1 through 4 and comparable areas measured by the ISGS results in net accretion of 28,300 cu yd (21,600 cu m) as measured by the City and net accretion of 32,800 cu yd (25,100 cu m) as determined by the ISGS. This is a difference of 14%. In addition, the ISGS calculated net accretion of 6,400 cu yd (4,900 cu m) in the Southern Lakeward Perimeter.

The objective of the ISGS volume calculations is to provide an independent check on the calculations reported by the City of Lake Forest. Differences occur for individual areas of evaluation, but there is overall agreement.

The 1993-1994 net change across the beach and nearshore sand of the area required for volume calculations can be summarized as follows:

1. Excluding the Southern Lakeward Perimeter Zone and excluding changes lakeward of the sand/clay interface, the ISGS and the City are in agreement within 4,500 cu yd. Net accretion, if the two values are averaged, was approximately 30,500 cu yd (23,300 cu m).
2. If the Southern Lakeward Perimeter Zone is included and all lake-bottom landward of the 1994 sand/clay interface is considered, ISGS calculations indicate the 1993-1994 net change is accretion totaling 39,200 cu yd (30,000 cu m).

#### **Volumetric Changes 1987-1994**

Data gathered over the past 4 years can be combined with data gathered during the initial 3 years of monitoring to estimate the total accretion and erosion in the Forest Park Beach area since its construction (table 6). Using a 0-ft threshold (all accretion and erosion considered) for 1992-1994 and a 1-ft (0.3 m) threshold for 1987-1992 and using ISGS calculations, the net change in the project area has been accretion of 69,000 cu yd (52,800 cu m). This is an average accretion of 9,900 cu yd (7,600 cu m) per year over the 7-year period from 1987 to 1994. Prior to the 1994 monitoring year, net change ranged from an annual accretion of 7,500 cu yd (5,700 cu m) during the first year following construction to erosion of 1,100 cu yd (800 cu m) during the 1992-1993 monitoring interval. The change in 1993-1994 was the greatest amount of net accretion to be documented in the project area during either of the monitoring programs and exceeded the accretion over the 4-year period from 1988 to 1992. Broken into the five monitoring areas, accretion and erosion for this 7-year period is as follows.



Net Accretion:

Updrift Zone	(+17,600 cu yd; +13,500 cu m)
Beach Cells	(+24,400 cu yd; +18,700 cu m)
Lakeward Perimeter	(+49,000 cu yd; +37,500 cu m)
Southern Lakeward Perimeter	(+10,700 cu yd; + 8,200 cu m)
Downdrift Zone	(+16,000 cu yd; +12,200 cu m)

Net Erosion:

Updrift Zone	(– 6,400 cu yd; – 4,900 cu m)
Beach Cells	(–12,100 cu yd; – 9,300 cu m)
Lakeward Perimeter	(– 6,500 cu yd; – 5,000 cu m)
Southern Lakeward Perimeter	(–11,100 cu yd; – 8,500 cu m)
Downdrift Zone	(–12,600 cu yd; – 9,600 cu m)

Table 6. Volumes of material accreted to or eroded from Forest Park Beach monitoring area since 1987.

Period	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987-1988 <sup>1</sup>	19,300	11,800	+7,500
1988-1992 <sup>1</sup>	33,700	10,300	+23,400
1992-1993 <sup>2</sup>	20,400	21,500	–1,100
1993-1994 <sup>2</sup>	44,300	5,100	+39,200
summation 1987-1994	117,700 <sup>3</sup>	48,700	+69,000

<sup>1</sup>One-foot threshold is used due to inaccuracies in data and less precise survey techniques earlier than 1992.

<sup>2</sup>Zero-foot threshold is used.

<sup>3</sup>Accretion may include a component of the beach nourishment supplied to the Downdrift Zone by the City of Lake Forest between 1991 and 1993.



## **PART 2: COASTAL PROCESSES**

### **INDICATIONS OF LITTORAL SEDIMENT BYPASS**

#### **Sand/Clay Interface**

Figure 22 shows the location of the sand/clay interface as it was mapped in 1994. For reference, the location of the interface is also shown for 1986 and each year from 1988 to 1993. Prior to 1991, the interface was mapped on the basis of an examination of fathometer traces. Since 1991, the interface has been mapped by diver survey.

A sufficient number of years of interface mapping has now been completed so that it is possible to identify the areas that are remaining consistent in location of the interface and the areas that are more active in terms of changes in location of the interface.

Since 1991, there has been no significant change in the location of the interface from the north limit of the monitoring area southward to opposite Beach Cell 3 (and the south end of Breakwater IV). Along this reach, the interface is essentially shore parallel and located about 180 ft (55 m) lakeward of Breakwater IV. Lakeward of the fillet beach at the north end, the interface had been mapped as having a double "v" pattern of offshore protrusion in 1992. The 1994 survey identified the north protrusion, but not the one to the south. This is apparently an area of complex and changing sand distribution, and it is an area difficult to map consistently. The annual presence or absence of this "v" pattern should not be interpreted as being a response to the Forest Park Beach facility.

The area of significant change from 1993 to 1994, as well from 1991 to 1994, has been the reach from Beach Cell 3 to just south of the Forest Park Beach facility's south boundary. As compared with the location of the interface in 1993 and 1994, major change occurred lakeward of Breakwaters I, II, and III and Beach Cell 4. The interface shifted farther southward (downdrift) and also farther offshore in this area (fig. 22). The maximum downdrift change in position is about 450 ft (137 m). This downdrift change for 1993-1994 is about twice as much as occurred in this general area in 1992-1993. The downdrift shift is consistent with the continuing development of a sand wedge around the lakeward perimeter of the facility. The wedge will be a pathway for sand bypass. The lakeward protrusion of the interface recorded in 1994 is consistent with a trend in the interface positions in 1993 and 1992 (and possibly 1991), in which there is a lakeward protrusion that begins opposite Beach Cell 3.

Downdrift from the south end of Breakwater I, for both 1993 and 1994, the sand/clay interface is mapped as being much closer to shore. In 1994, the interface even came close to intercepting the shore at the south end of the south riprap. This area downdrift from the small-boat basin is being deprived of littoral sediment supply at the expense of sand accumulation occurring updrift. At the very south end of the facility, the interface shows a shift of as much as 260 ft (80 m) between 1993 and 1994. This shift may have to do with 1993 being the final year of beach nourishment. The 1993 beach nourishment was dumped in this area, and the 1993 sand/clay interface was mapped after the time of nourishment.

The most significant observation for the downdrift shore at the south limit of the monitoring area is that the 1994 data show that the interface location is positioned as it was first mapped in 1986. Although loss of lake-bottom sand cover can be identified near the south end of Forest Park Beach, the nearshore zone at the south end of the monitoring area has not been depleted of a sand cover.

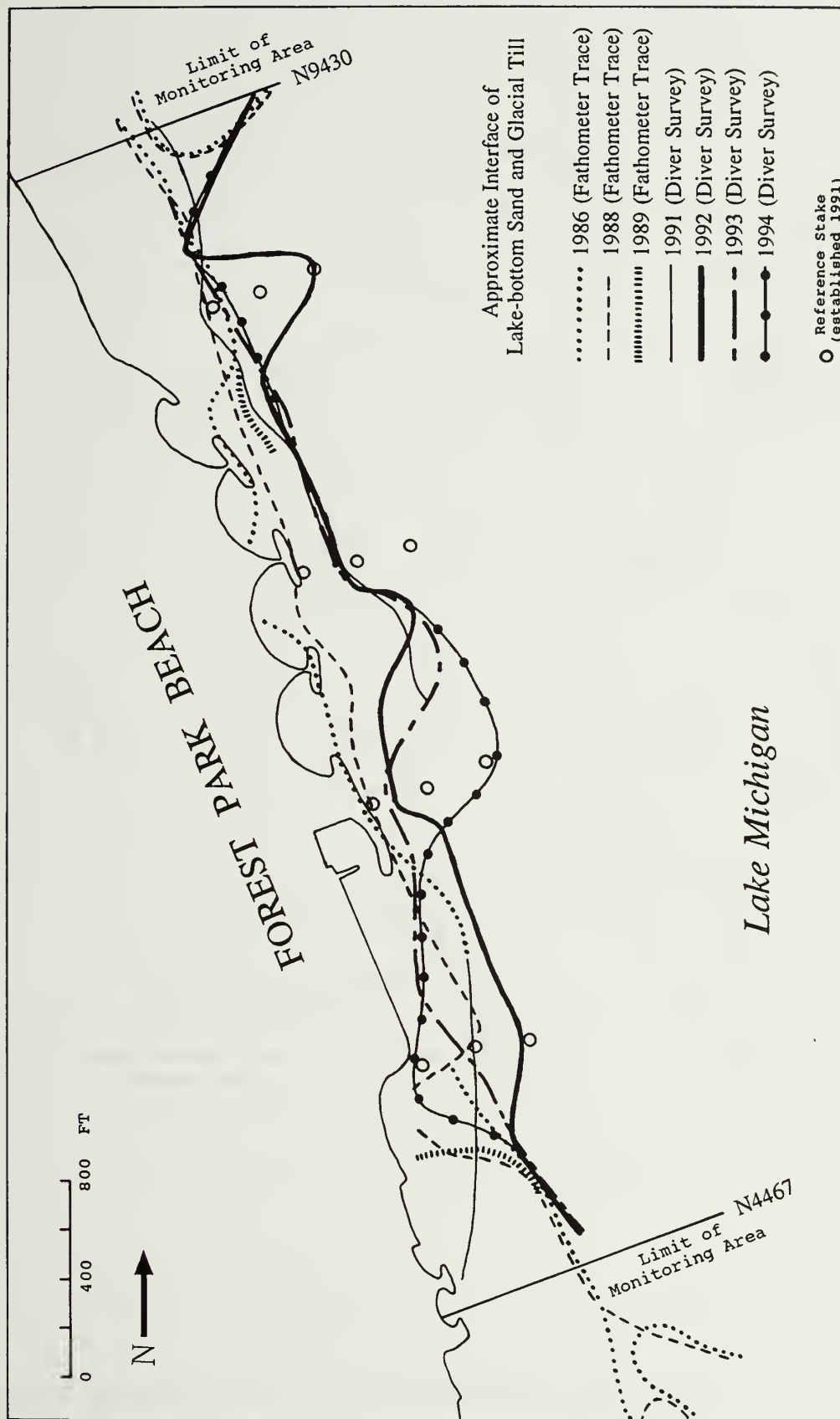
#### **Lake-Bottom Morphology**

The configuration of bathymetric contours around the perimeter of the Forest Park Beach facility indicates accretion forming a "sand bridge" for natural sand bypass around the lakeward perimeter of the project. As noted in the ISGS reports for the 1992 and 1993 monitoring, annual comparisons of the position of the 10-ft (3-m) depth contour provide a good reference for observing the southward advance of this accretion (fig. 23).







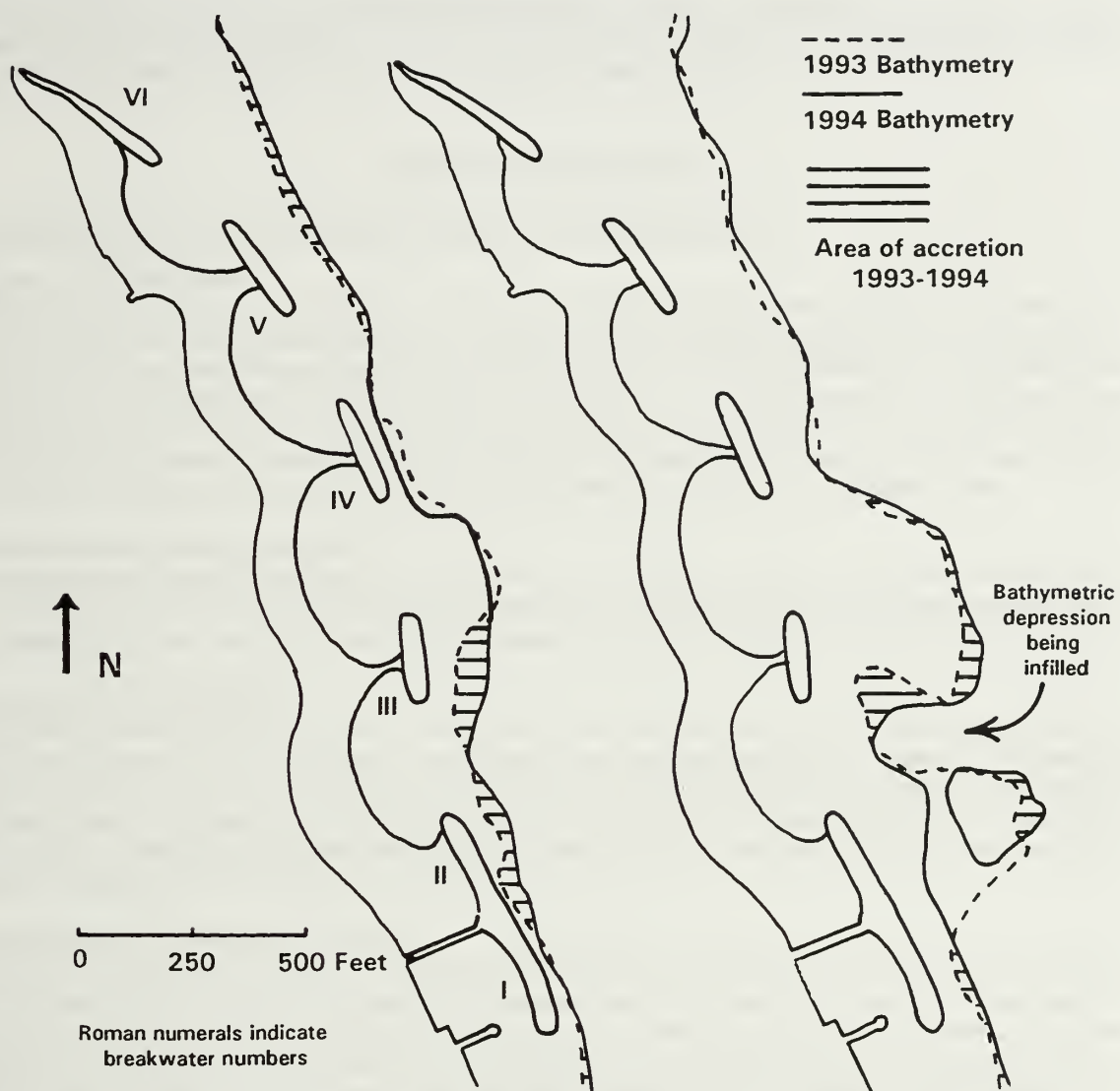


**Figure 22** Location of the interface of lake-bottom sand and glacial till. 1986, 1988, and 1989 mapping from Lake Forest Shoreline Monitoring Committee (1990b); 1991 mapping from CH2M HILL (1992); 1992 mapping from Magnus (1993a); 1993 mapping from Magnus (1993b); 1994 mapping from Magnus et al. (1994).



# 10-foot Contour

# 12-foot Contour



**Figure 23** Location of 10-ft and 12-ft bathymetric contours in 1993 and 1994.



The leading downdrift edge of this accretion wedge is in a broad area opposite Beach Cell 4 and Breakwaters I and II. In 1992 and 1993, the 10-ft contour intercepted Breakwaters I and II. In 1994, it shifted lakeward of these breakwaters (fig. 23) as accretion occurred along the lakeward margin of the breakwaters.

The 12-ft contour shows the nature of infilling of the bathymetric depression opposite Beach Cell 4. In 1993, substantial accretion had occurred on the northward margin of this depression. As can be seen in figure 23, additional accretion occurred at the head of this depression during the 1993-1994 interval.

## **PART 3: SUMMARY**

### **RECOMMENDATIONS FOR FUTURE MONITORING AND REPORTING**

#### **Addition of Profile Lines**

Profile data should continue to be collected along the lines between Breakwater I and the south end of the riprap opposite the south parking area (i.e., between profiles N6550 and N5617). This is the site for development of an accretionary wedge from natural bypass of the project. Monitoring the development of and changes to this accretion will require profiles along this reach. In the 1992 and 1993 ISGS monitoring, additional lines were run along this reach at a 200-ft (61-m) line spacing. The City of Lake Forest voluntarily expanded their monitoring area in 1994 (year 4) to include profile data collection along this reach, using the profile lines originally surveyed by the ISGS. This monitoring should be continued in 1995.

#### **Preferred Data Collection Method**

The method used by the City of Lake Forest to collect nearshore profile data, using a total station and a prism pole held from a boat moving along the profile line, is one of the most accurate and precise means of collecting such data. This method should be continued through the remainder of the monitoring program.

#### **Presentation of Profile Data**

Profile data gathered by the City of Lake Forest in the 1995 monitoring should be presented in tables that show consecutive points for all onshore and offshore data for each profile and should be consistently ordered in either a shoreward or lakeward direction. Data sets for individual profiles should be separated from each other and labeled as was done in the City's 1994 report. In addition, miscellaneous data points of no value in constructing a profile line should be deleted from the data set. These unnecessary points include control points for establishing each line.

#### **Regional Littoral Transport Processes**

An overview of regional littoral transport processes will be included in the ISGS report for the fifth and final year of monitoring. In order to evaluate the accretional history at Forest Park Beach, it is necessary to consider beach and nearshore changes that have been occurring updrift of Lake Forest. For example, bypass of littoral sediment at Great Lakes Harbor is important, as is the dispersion of dredge spoil removed from Waukegan Harbor and dumped in the nearshore downdrift of the harbor. Insights related to the regional littoral processes will be gained from the ISGS contributions to the Interim IV Study sponsored by the U.S. Army Corps of Engineers. This study examines storm damage and coastal processes from Waukegan Harbor to Wilmette Harbor. The final report of the Interim IV Study is scheduled for completion in July 1996.

#### **Coastal Monitoring Beyond 1995**

The final year of this 5-year monitoring program will involve data collection in 1995. Lake-bottom changes in the vicinity of Forest Park Beach will not have reached a dynamic equilibrium by that time. Continued monitoring, at least on a limited basis, will be required to determine the net impact of this facility on local and regional littoral transport.





## CONCLUSIONS

The 1994 data collection at Forest Park Beach represents the fourth year in a proposed 5-year monitoring program that will span from 1991 to 1995. Final evaluation of the impact of this project on local littoral-transport processes and identification of any adverse effects will occur at the completion of the monitoring program.

The role of the ISGS during the 1994 monitoring program was to act as an independent reviewer of the data collection and data presentation by the City of Lake Forest. The 1993 ISGS data collection and data processing also provide supplemental information to complement the 1994 work done by the City of Lake Forest. The following conclusions are drawn from this review and study:

1. The method used by the City of Lake Forest for acquisition of profile data is strongly recommended for use in the final year of the planned 5-year program. This data collection involves the use of a prism pole and total station. The data collected by the City of Lake Forest in 1992, 1993, and 1994 are the most detailed data collected at Forest Park Beach since post-construction monitoring began in 1987.
2. Profile data collected by the City of Lake Forest in 1994 were verified by the ISGS as being accurate, reproducible, and valid for comparison against future monitoring data and against data sets collected in the past.
3. The City of Lake Forest added four profile lines (N5817, N6017, N6217, and N6417) in 1994; they are located opposite the south riprap and Breakwater I. These additional profiles were added at the discretion of the City of Lake Forest. Although they are not part of the original monitoring program proposed by the U.S. Army Corps of Engineers, it is strongly recommended that the City run them again in 1995. These profiles cover the most active area of ongoing lake-bottom change related to the southward advance of a "sand bridge" along the lakeward perimeter of the project.
4. No sand nourishment was conducted by the City in 1994; 1993 was the final year for which nourishment was required by the U.S. Army Corps of Engineers. The lack of nourishment in 1994 may be responsible for the sand/clay interface reaching its most landward position, which was recorded on the extreme south end of the Forest Park Beach facility.
5. The major change in position of the sand/clay interface between 1993 and 1994 occurred lakeward of Beach Cell 4 and Breakwaters I and II. This was also the area of major change in 1992-1993. The interface recorded in 1994 for this area was shifted up to 450 ft (137 m) southward (downdrift) of the 1993 location. The interface also had advanced farther lakeward than had been previously mapped. The downdrift and lakeward advance of the interface is consistent with sand accretion that is occurring in this area and is related to the building of a "sand bridge" for natural bypass of the facility.
6. Comparisons of topographic and bathymetric data collected in 1993 and 1994 indicate that beach and lake-bottom accretion occurred (1) in the updrift nearshore bar and at the mouth of Beach Cell 1; (2) offshore of Beach Cell 4, (3) lakeward of Breakwater II; and (4) in the privately owned groin field south of the project. Erosion greater than 1 ft in thickness occurred primarily along the lakeward margin of Breakwaters III and IV and in the southern part of Beach Cell 4. Maximum thicknesses of accretion ranged from 3 to 4 ft (0.9 to 1.2 m), while maximum thicknesses of erosion ranged from 1 to 2 ft (0.3 to 0.6 m). Maximum accretion occurred in Beach Cell 1 and lakeward of Beach Cell 4. Maximum erosion occurred on the lakeward side of Breakwater IV.
7. Accretion in the privately owned groin field south of the project is thought to be a combined result of natural bypass of sediment past the project breakwaters and nourishment placed by the City at the south end of the project following the 1993 monitoring.



8. Volumetric calculations of 1993-1994 accretion and erosion in the monitoring area were reported by the City of Lake Forest (work performed by W. F. Baird & Associates, Ltd.). Independent ISGS volume calculations result in relatively close agreement. When the common areas in the two analyses are compared, accretion was the net change throughout the monitoring area between 1993 and 1994. For a 0-ft threshold (i.e., all changes greater than 0 ft) and rounded to the nearest 100 cu yd (cu m), the 1993-1994 estimates of net accretion volume are as follows:

ISGS: + 32,800 cu yd (25,100 cu m)  
City of Lake Forest: + 28,300 cu yd (21,700 cu m)

The primary area of accretion was in the updrift bar and Beach Cell 1 and lakeward of Beach Cell 4. It is important to note that these figures do not include volume changes across the lake bottom from the north end of Breakwater I to the south end of the southern revetment (i.e., between profiles N6550 and N5617). Prior to 1994, the City did not collect data in this area.

9. Based on the 1993-1994 volumetric calculations by the ISGS using a 0-ft threshold and the 12-ft or 15-ft contour as a lakeward boundary, the volume changes (rounded to the nearest 100) are as follows:

Net Accretion:

Updrift Zone	(+ 9,600 cu yd; +7,300 cu m)
Beach Cells	(+ 6,100 cu yd; +4,700 cu m)
Lakeward Perimeter	(+11,200 cu yd; +8,600 cu m)
Southern Lakeward Perimeter	(+ 7,000 cu yd; +5,400 cu m)
Downdrift Zone	(+10,400 cu yd; +8,000 cu m)

Net Erosion:

Updrift Zone	(- 800 cu yd; - 600 cu m)
Beach Cells	(- 1,500 cu yd; -1,100 cu m)
Lakeward Perimeter	(- 1,600 cu yd; -1,200 cu m)
Southern Lakeward Perimeter	(- 600 cu yd; - 500 cu m)
Downdrift Zone	(- 600 cu yd; - 500 cu m)

10. The volumes computed by the ISGS include the area between profiles N6550 and N5617 (ISGS Southern Lakeward Perimeter); thus, the summation of these volumes provides a complete documentation of 1993-1994 net change in the entire monitoring area. ISGS data indicate that substantial net accretion occurred between 1993 and 1994 in all areas of the Forest Park Beach project. The summation of net changes in Item 9 results in a net accretion of 39,200 cu yd (30,000 cu m) in 1993-1994.
11. The 1993-1994 net accretion of 39,200 cu yd (30,000 cu m) is the largest net accretion to occur in any 1-year interval of the present monitoring program. This attests to the short-term fluctuation that can be expected in the supply and entrapment of littoral sediment caused by the interplay of a variety of factors, including lake-level changes, storm frequency and energy, and degree of updrift erosion and transport.
12. The long-term (1987-1994) lake-bottom change is net accretion of 69,000 cu yd (52,800 cu m). This level of accretion is primarily a result of the extensive accretion that occurred during the interval from 1993 to 1994. Widely varying annual changes demonstrate the importance of the long-term record. In considering the long-term record, it is important to note that this record uses volumes calculated with a 1-ft threshold because of some uncertainties in the early fathometer data. Annual volume changes since 1992 have been calculated using a 0-ft threshold because of improved primary data collection (e.g., using the prism pole and total station).



13. Based on ISGS volumetric calculations for the interval 1987-1994 (the first 7 years following construction) and using a 1-ft threshold (1987-1992) or a 0-ft threshold (1992-1994) for recording erosion or accretion changes, the following volumes are computed (rounded to the nearest 100):

Net Accretion:

Updrift Zone	(+17,600 cu yd; +13,500 cu m)
Beach Cells	(+24,400 cu yd; +18,700 cu m)
Lakeward Perimeter	(+49,000 cu yd; +37,500 cu m)
Southern Lakeward Perimeter	(+10,700 cu yd; + 8,200 cu m)
Downdrift Zone	(+16,000 cu yd; +12,200 cu m)

Net Erosion:

Updrift Zone	(- 6,400 cu yd; - 4,900 cu m)
Beach Cells	(-12,100 cu yd; - 9,300 cu m)
Lakeward Perimeter	(- 6,500 cu yd; - 5,000 cu m)
Southern Lakeward Perimeter	(-11,100 cu yd; - 8,500 cu m)
Downdrift Zone	(-12,600 cu yd; - 9,600 cu m)

The summation is net accretion of 69,000 cu yd (52,800 cu m). This volume has limited application at this time relative to determining how much littoral sediment the project has trapped since construction. Such a determination will be made at the conclusion of the ongoing 5-year monitoring program.

14. Several lines of evidence document the continuing development of an accretionary wedge that is located along the lakeward perimeter of the project and forms a sand bridge for natural bypass of the project. This evidence includes the lake-bottom morphology, trends in accretion and changes to the lake-bottom morphology, location of the sand/clay interface, and trends in changes to the location of the interface. As of the 1994 data collection, the leading edge of this accretionary wedge is opposite Beach Cell 4 (based on the 10- and 12-ft contours). Some southward advance occurred between 1993 and 1994, but advance during this time (and since at least 1992) has been slowed by the infilling of a lake-bottom depression opposite Beach Cell 4 and Breakwaters I and II.
15. The localized lake-bottom depression opposite Beach Cell 4 will likely continue to slow the southward advance of the accretionary wedge on the lakeward perimeter of the facility. It is unlikely that a complete "sand bridge" will be in place around the entire facility by 1995, the end of the proposed 5-year monitoring program.





## ACKNOWLEDGMENTS

This ISGS monitoring project at Forest Park Beach could not have been successfully completed without the cooperation and assistance of the City of Lake Forest Engineering Department, Police Department, and Department of Parks, Forestry and Public Works. The staff in charge of Forest Park Beach were particularly helpful in providing assistance for short-term storage of the ISGS boat and other equipment, and other logistics related to the ISGS field work.

ISGS personnel assisting in the field studies at Forest Park Beach were Mark Hart and Robert Lambert. Matthew Alu assisted with the data processing and computer plotting of base maps, profiles, and profile comparisons, as well as preparation of graphics for the final report. Douglas Mulvey also assisted in preparation of report graphics. Christine Fucciolo assisted in preparation of plots of bathymetry and lake-bottom change and in performing the volumetric analysis for 1993-1994 accretion and erosion.

This study was primarily funded by the Illinois Department of Transportation Division of Water Resources under IDOT Project No. WR-09118/SRA-190. Additional funding was provided by the Illinois State Geological Survey.



## REFERENCES

- Anglin, C.D., MacIntosh, A.M., Baird, W.F., and Werren, D.J., 1987, Artificial beach design, Lake Forest, Illinois: *in* Magoon, O.T., and four others (eds.), Coastal Zone '87, Proceedings of the Fifth Symposium on Coastal and Ocean Management, Seattle, Washington, May 26-29, 1987, American Society of Civil Engineers, New York, v. 1, p. 1121-1129.
- Baird, W.F., & Associates, 1993a, Data conversion and volumetric analysis, 1988 to 1992, Forest Park Beach: prepared for The City of Lake Forest, August 23, 1993: W.F. Baird & Associates, Ltd., Madison, Wisconsin, 18 p.
- Baird, W.F., & Associates, 1993b, Data conversion and volumetric analysis, 1992 to 1993, Forest Park Beach: prepared for The City of Lake Forest, December 7, 1993: W. F. Baird & Associates, Ltd., Madison, Wisconsin, 4 p., 13 drawings.
- Baird, W.F., & Associates, 1994, 1994 beach and nearshore monitoring program, volumetric analysis, Forest Park Beach: prepared for the City of Lake Forest, December 1994: W. F. Baird & Associated, Ltd., Madison, Wisconsin, 3 p., 13 drawings.
- CH2M HILL, 1992, Shoreline monitoring of Forest Park Beach, Lake Forest, Illinois, Volume 1: CH2M HILL, Bellevue, Washington, 11 p. plus 2 tables, 8 figures, 4 appendices.
- Chrzastowski, M.J., and Trask, C.B., 1992, Review of the final report for the 1991 beach and nearshore monitoring program at Forest Park Beach, Lake Forest, Illinois: contract report submitted to Illinois Department of Transportation Division of Water Resources (Project WR-09118/SRA-190), Illinois State Geological Survey, Champaign, Illinois, 64 p. plus four appendices.
- Chrzastowski, M.J., and Trask, C.B., 1994, Review of the final report for the 1993 beach and nearshore monitoring program at Forest Park Beach, Lake Forest, Illinois: contract report submitted to Illinois Department of Transportation Division of Water Resources (Project WR-09118/SRA-190), Illinois State Geological Survey, Champaign, Illinois, 56 p. plus six appendices and one plate.
- Environmental Systems Research Institute, Inc., 1991, Surface modeling with TIN, ARC/INFO Users Guide Rev. 6.0: Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, 213 p. plus four appendices.
- Lake Forest Shoreline Monitoring Committee, 1990a, A review of assessment of the shoreline monitoring program for the Forest Park shoreline development project, Lake Forest, Illinois, Executive Summary and Report (Part 1 of 2): The Lake Forest Shoreline Monitoring Committee, Lake Forest, Illinois, 74 p.
- Lake Forest Shoreline Monitoring Committee, 1990b, A review of assessment of the shoreline monitoring program for the Forest Park shoreline development project, Lake Forest, Illinois, Appendices (Part 2 of 2): The Lake Forest Shoreline Monitoring Committee, Lake Forest, Illinois, 123 p.
- Magnus, K.M., 1993a, The City of Lake Forest 1992 Forest Park Beach monitoring program, volume 1: The City of Lake Forest, Illinois, 11 p. plus three appendices.
- Magnus, K.M., 1993b, The City of Lake Forest 1993 Forest Park Beach monitoring program, volume 1: The City of Lake Forest, Illinois, 11 p. plus four appendices.
- Magnus, K.M., Hammer, A., Mock, C., and Miller, P., 1994, The City of Lake Forest 1994 Forest Park Beach monitoring program, volume 1: The City of Lake Forest, Illinois, 12 p. plus three appendices.
- Trask, C.B. and Chrzastowski, M.J., 1993, Review of the final report for the 1992 beach and nearshore monitoring program, Forest Park Beach, Lake Forest, Illinois: contract report submitted to Illinois Department of Transportation (IDOT) Division of Water Resources (IDOT Project No. WR-09118/SRA-190) Illinois State Geological Survey, Open File Series 1993-11, Champaign, Illinois, 78 p. plus 7 appendices, 1 map (scale 1:2400).



## DISTRIBUTION LIST

Bound copies of this report have been sent to the offices and libraries listed below. Copies of this report are available at the cost of reproduction from the ISGS.

### Offices

Illinois Department of Transportation  
Division of Water Resources  
Chicago, Illinois

The City of Lake Forest  
Lake Forest, Illinois

U.S. Army Corps of Engineers  
Chicago District  
Chicago, Illinois

### Libraries (Local and State)

City of Lake Forest Library  
Lake Forest, Illinois

City of Chicago Library  
Harold Washington Center  
Chicago, Illinois

Illinois State Geological Survey Library  
Champaign, Illinois

Illinois State Water Survey Library  
Champaign, Illinois

Illinois State Library  
Springfield, Illinois

### Libraries (Federal)

U.S. Geological Survey Library  
Reston, Virginia

U.S. Army Corps of Engineers  
Chicago District Library  
Chicago, Illinois

U. S. Army Corps of Engineers  
North Central Division Library  
Chicago, Illinois

U.S. Army Corps of Engineers  
Waterways Experiment Station  
CERC Library  
Vicksburg, Mississippi





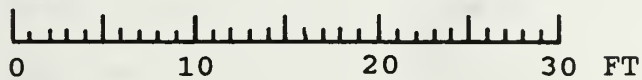
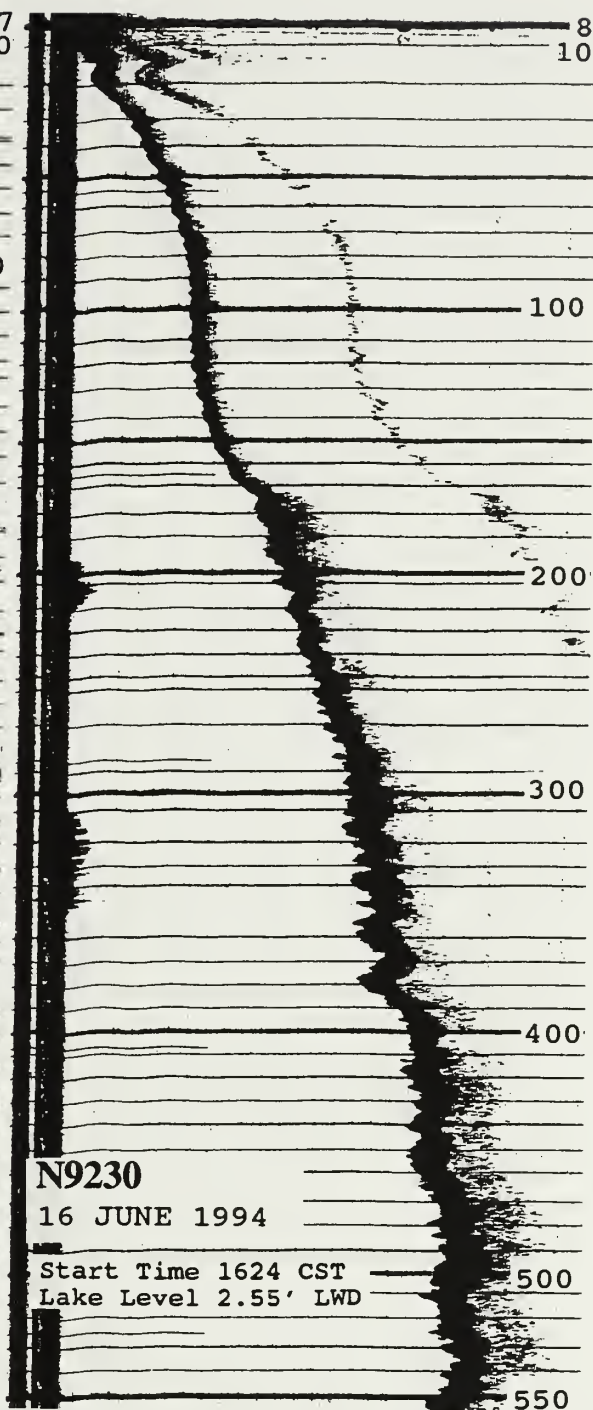
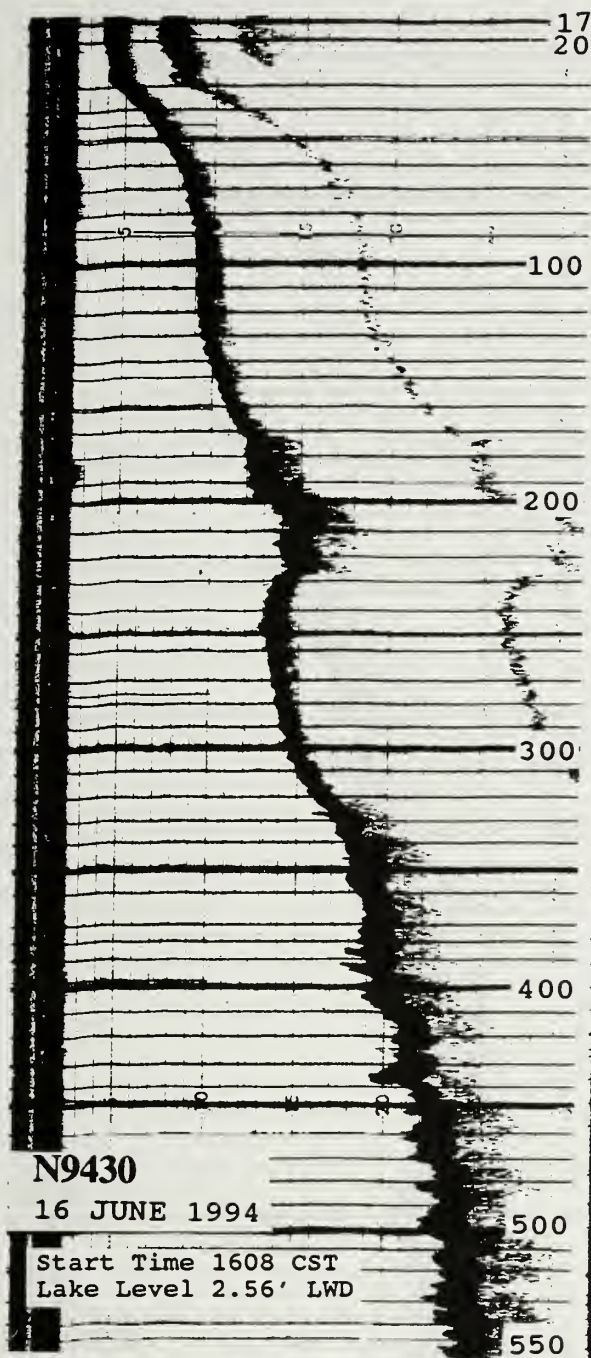
## **APPENDIX A ISGS FATHOMETER TRACES FOR JUNE AND JULY 1994**

The following are photo-reduced copies of the ISGS fathometer strip-charts for a distance of 1,804 ft (550 m) from the profile control point (lines N8630 and N8030 go to 500 m).

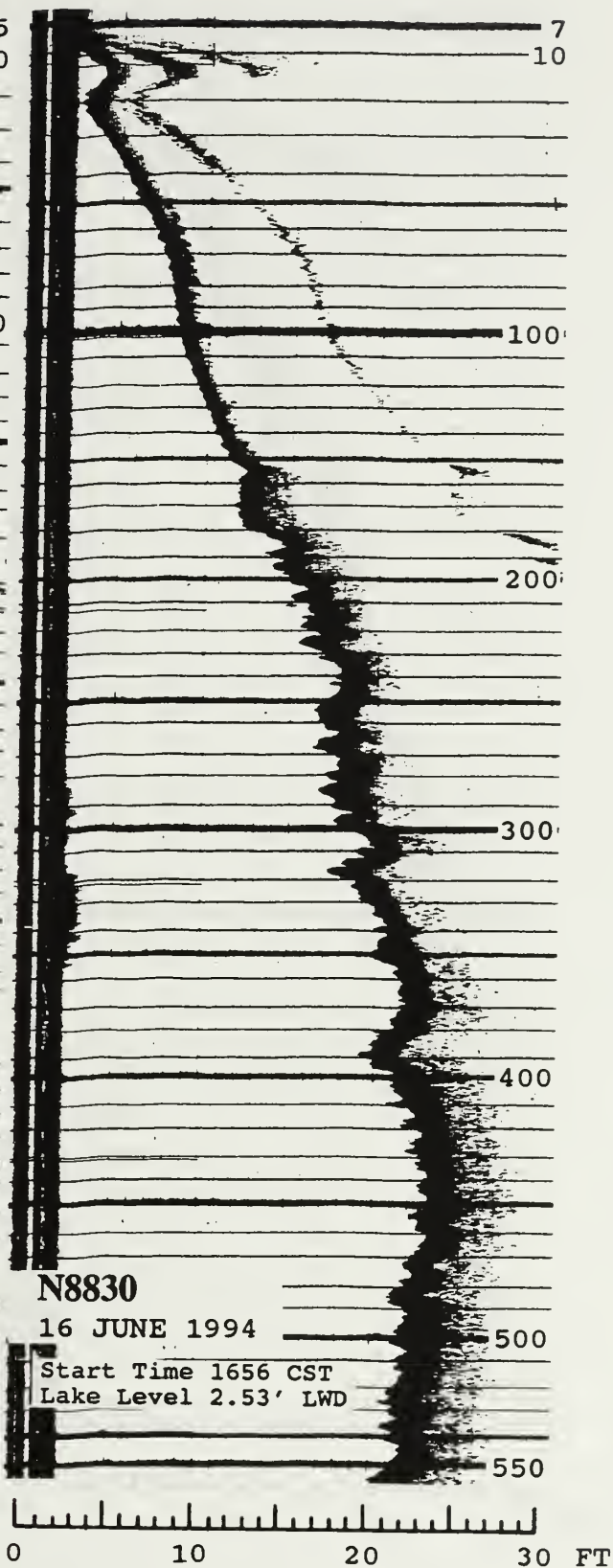
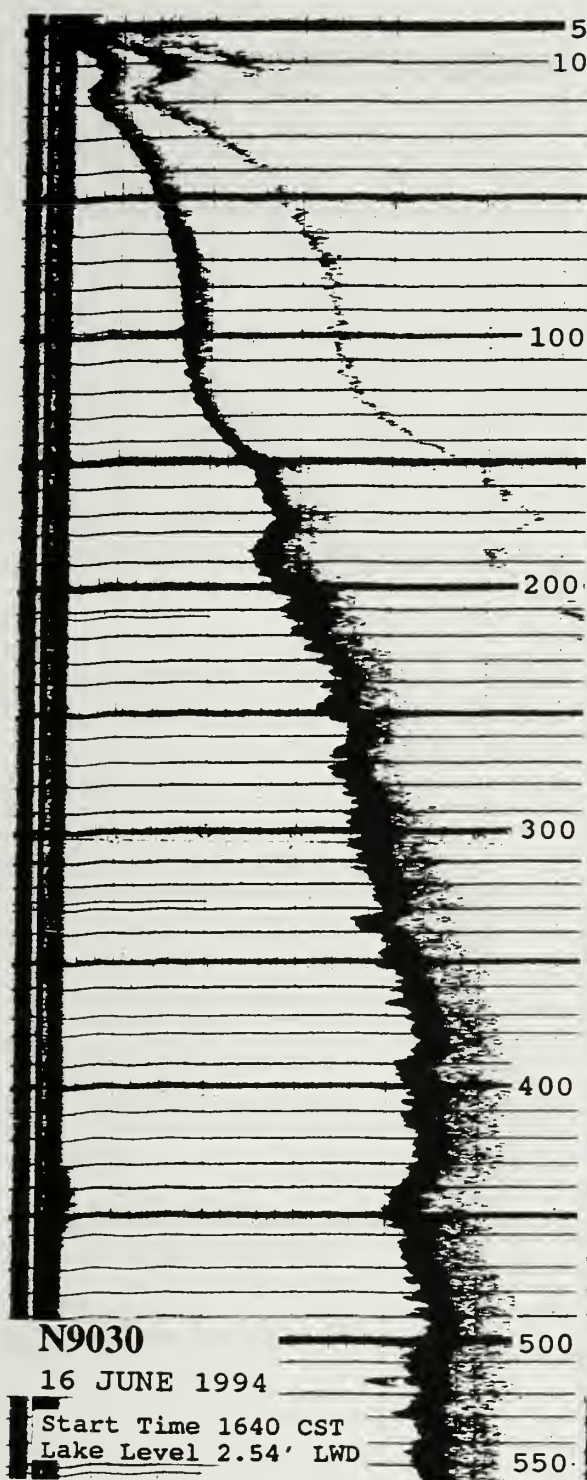
Vertical lines across each fathometer trace are event marks corresponding to 32.8-ft (10-m) increments as displayed on the console for the Motorola Mini-Ranger III.

Depth is recorded in feet referenced to the lake level at the time of the survey. No transducer draft correction is needed because the fathometer trace already incorporates this correction.



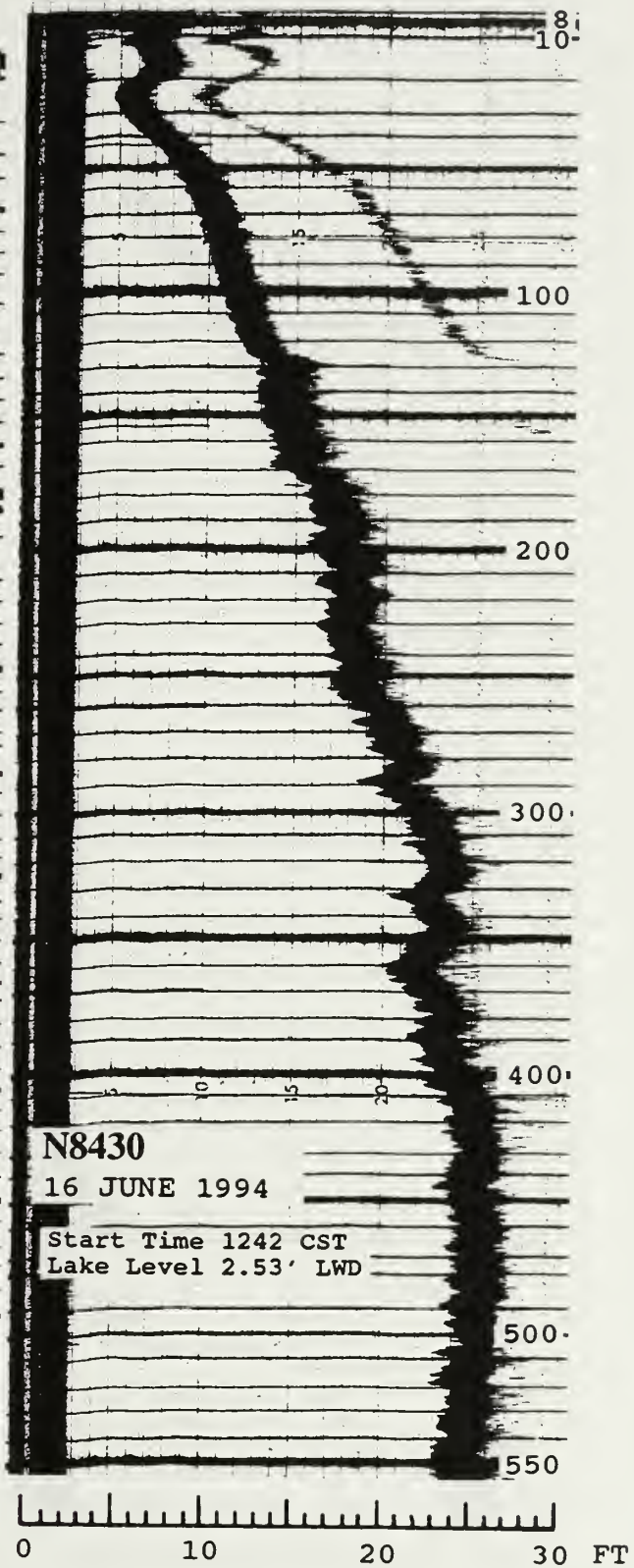
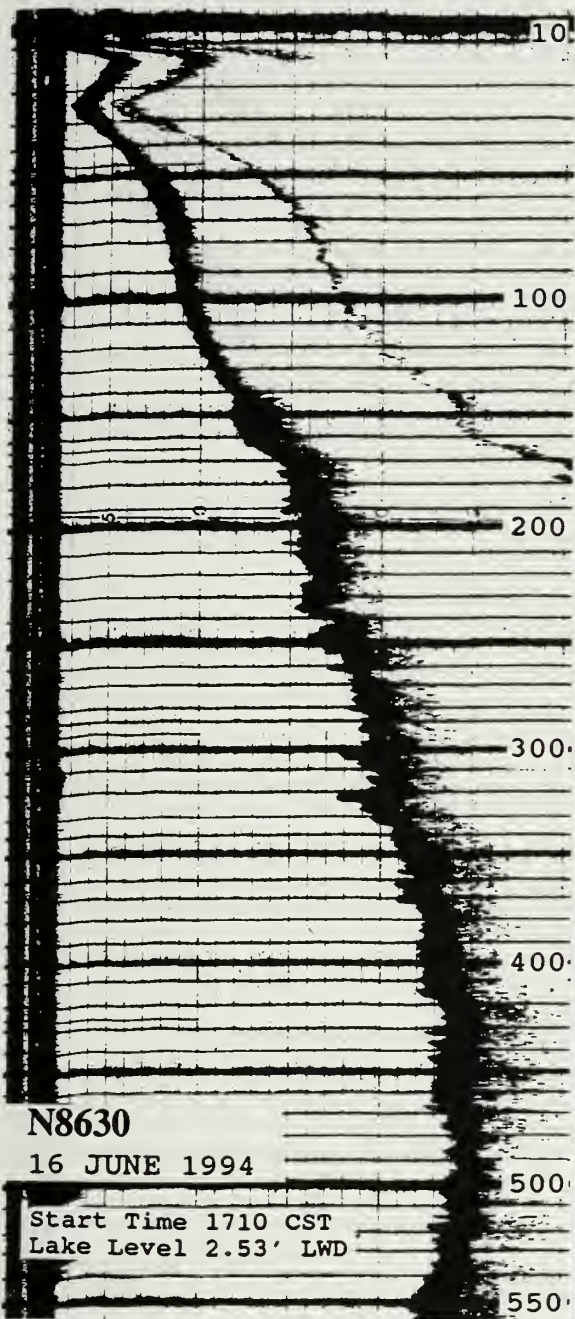




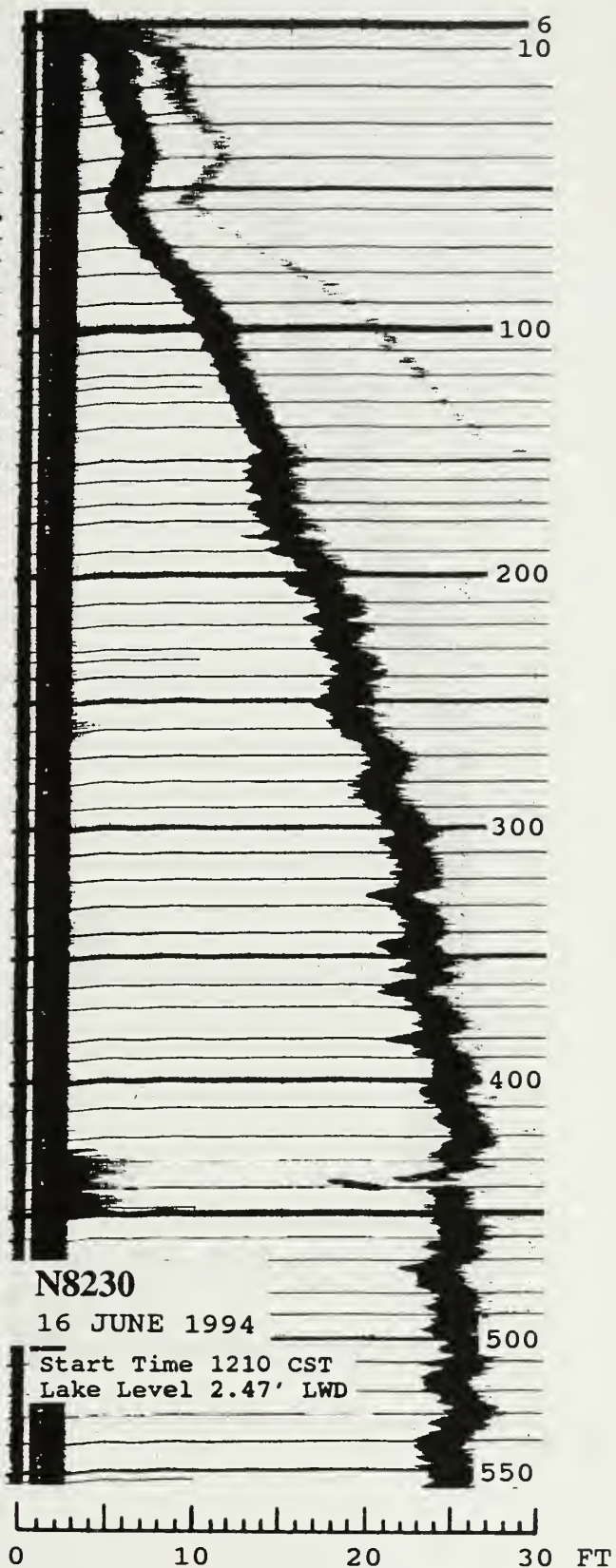
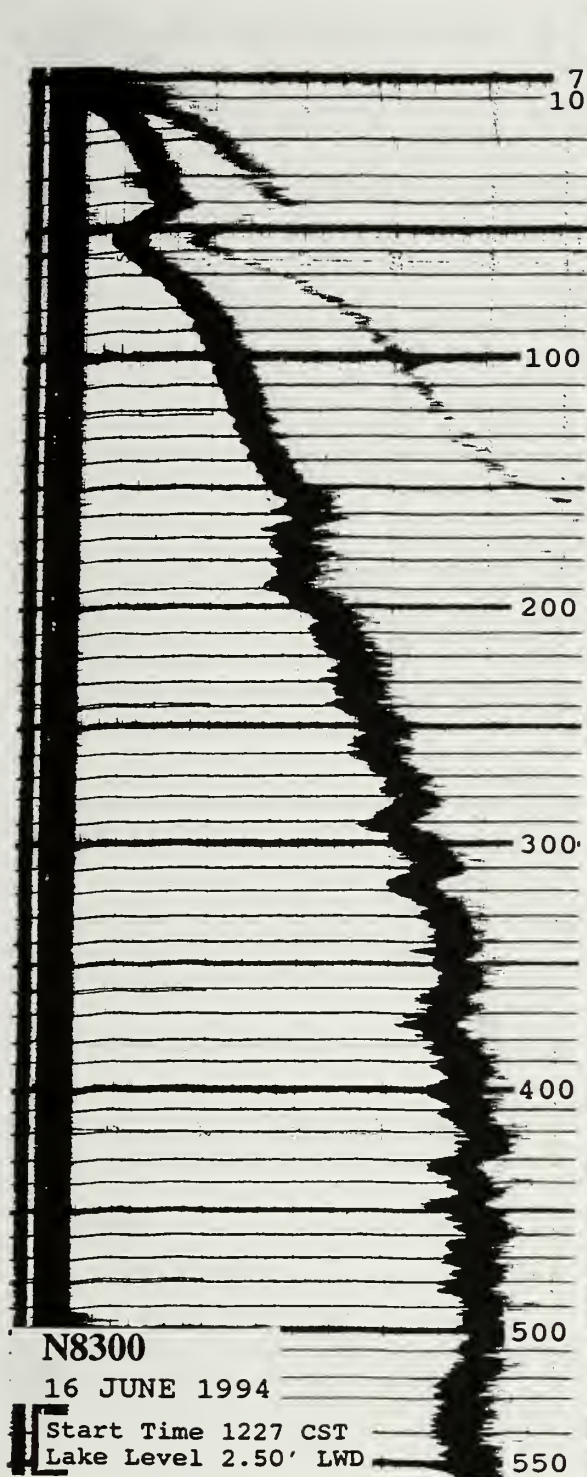






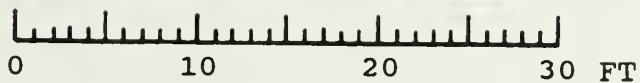
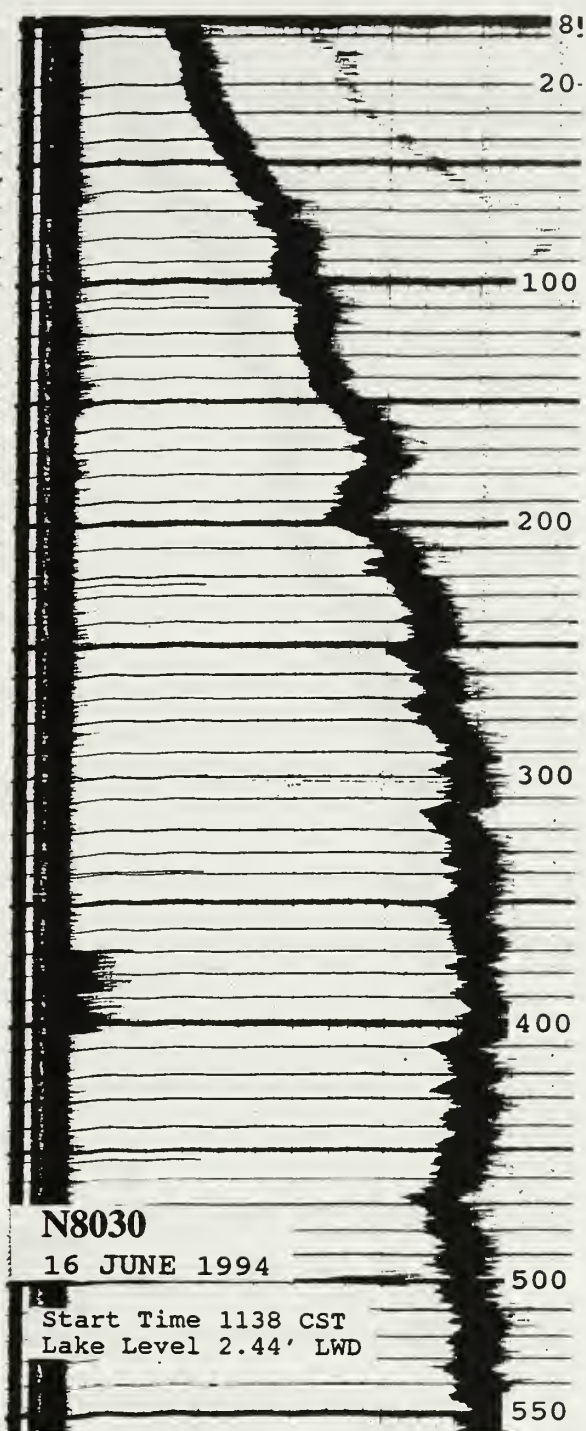
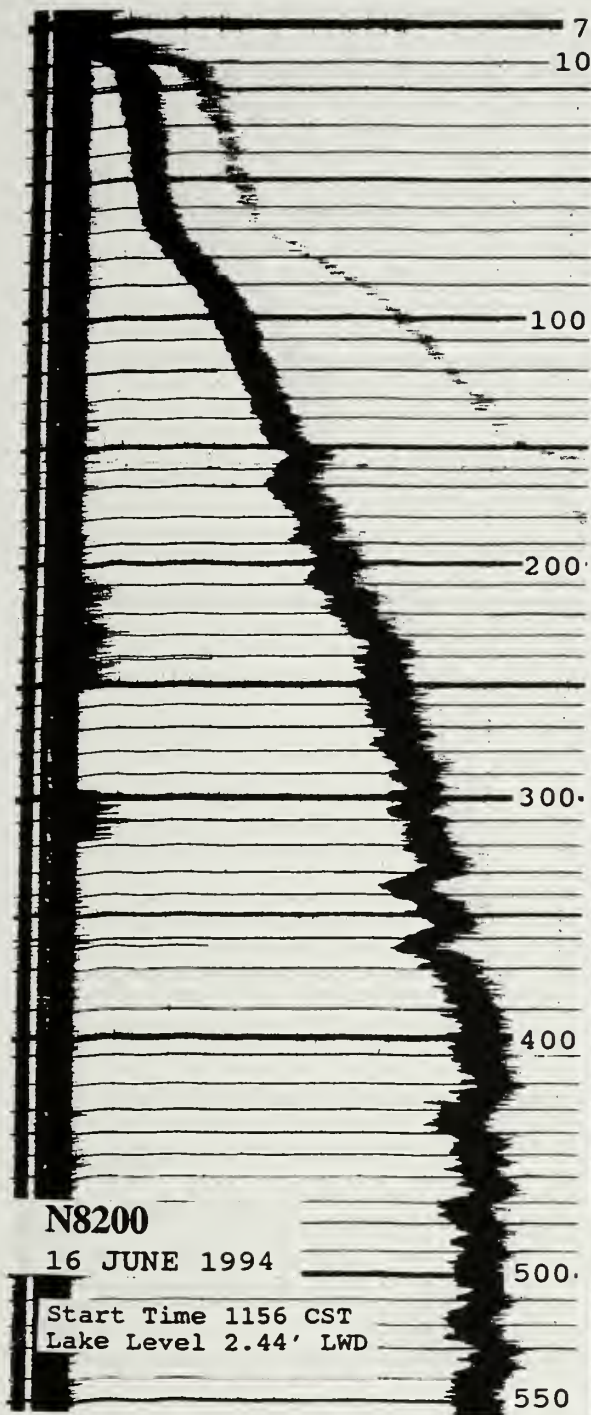






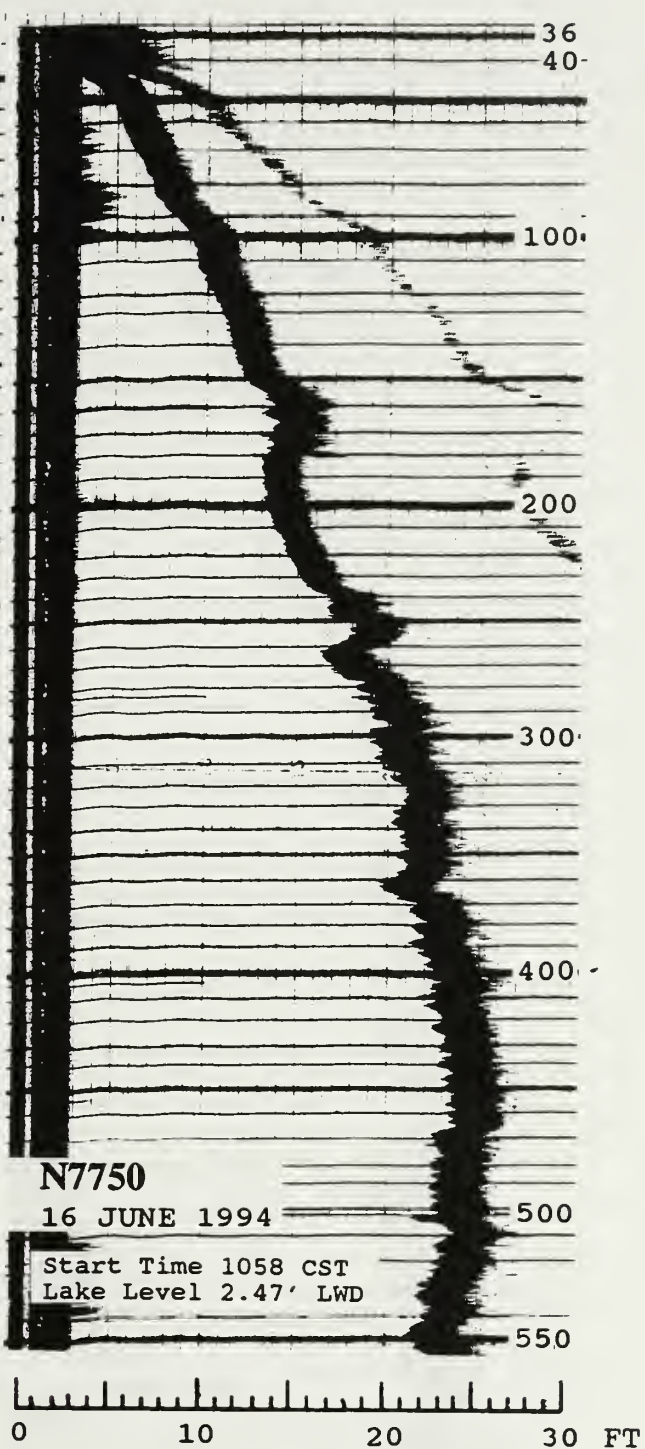
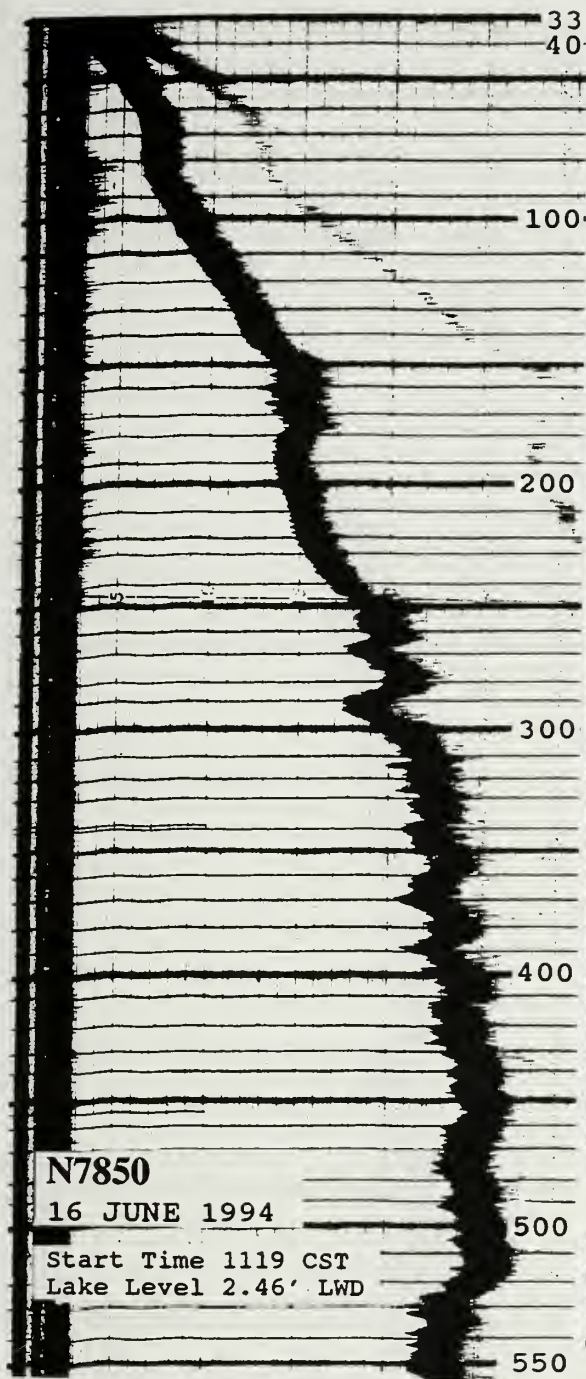




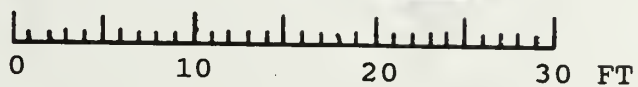
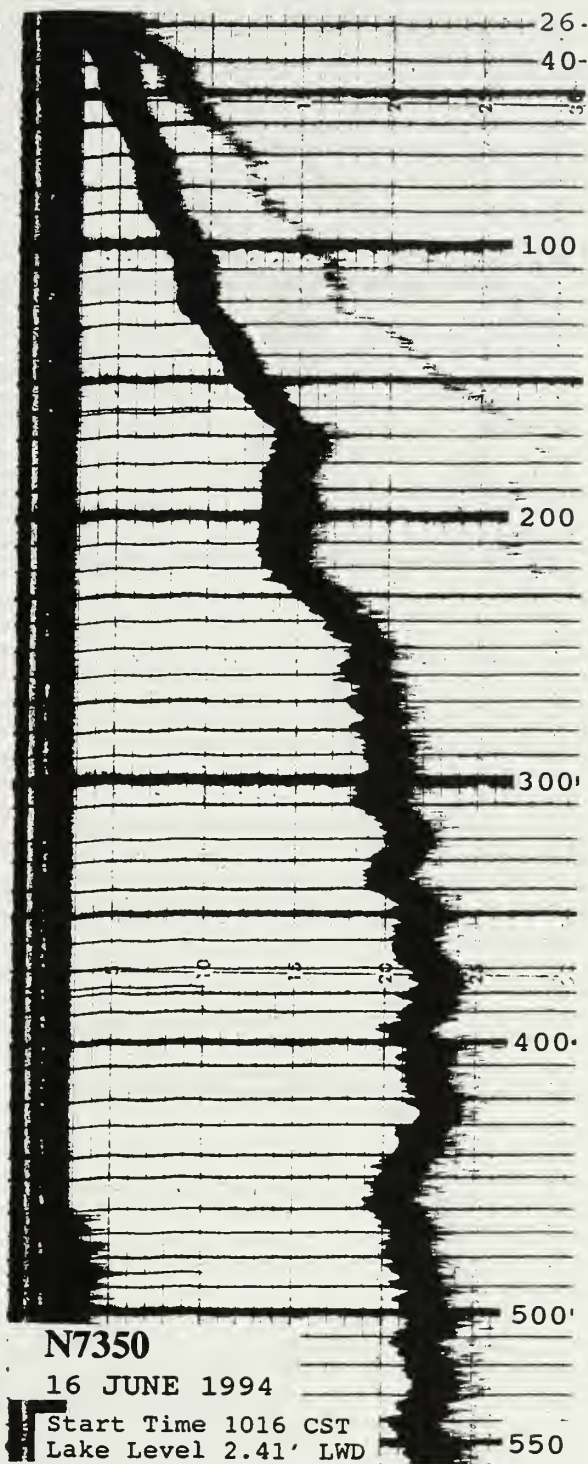
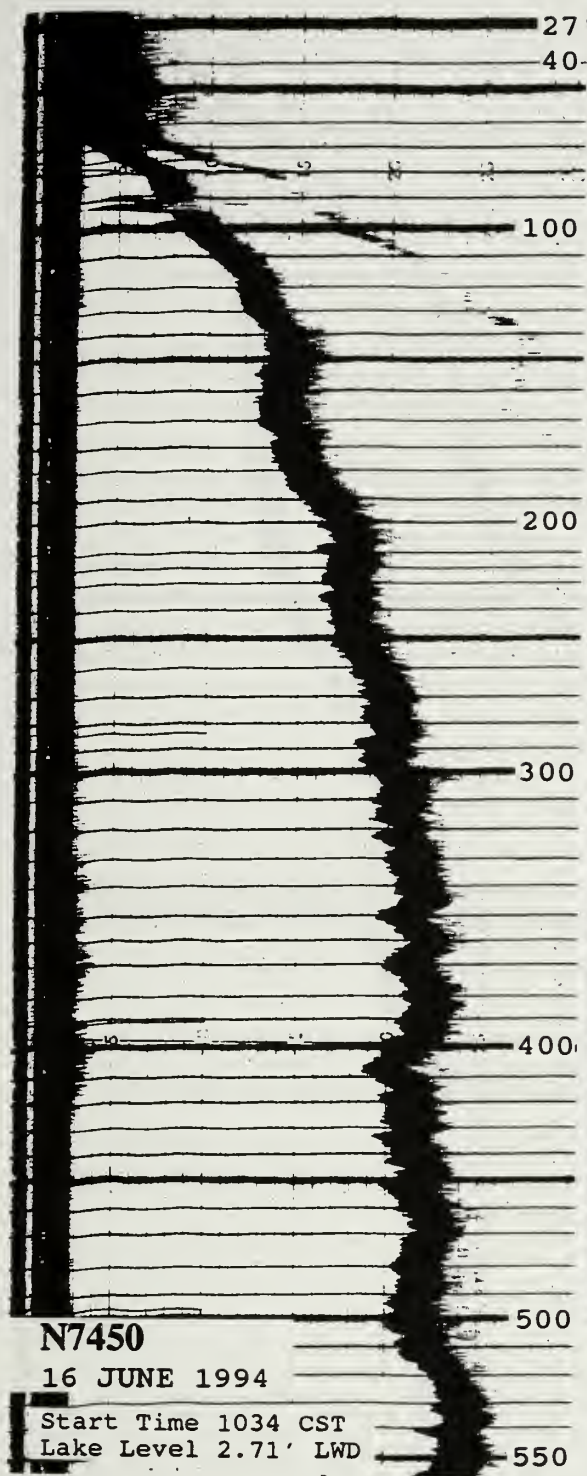






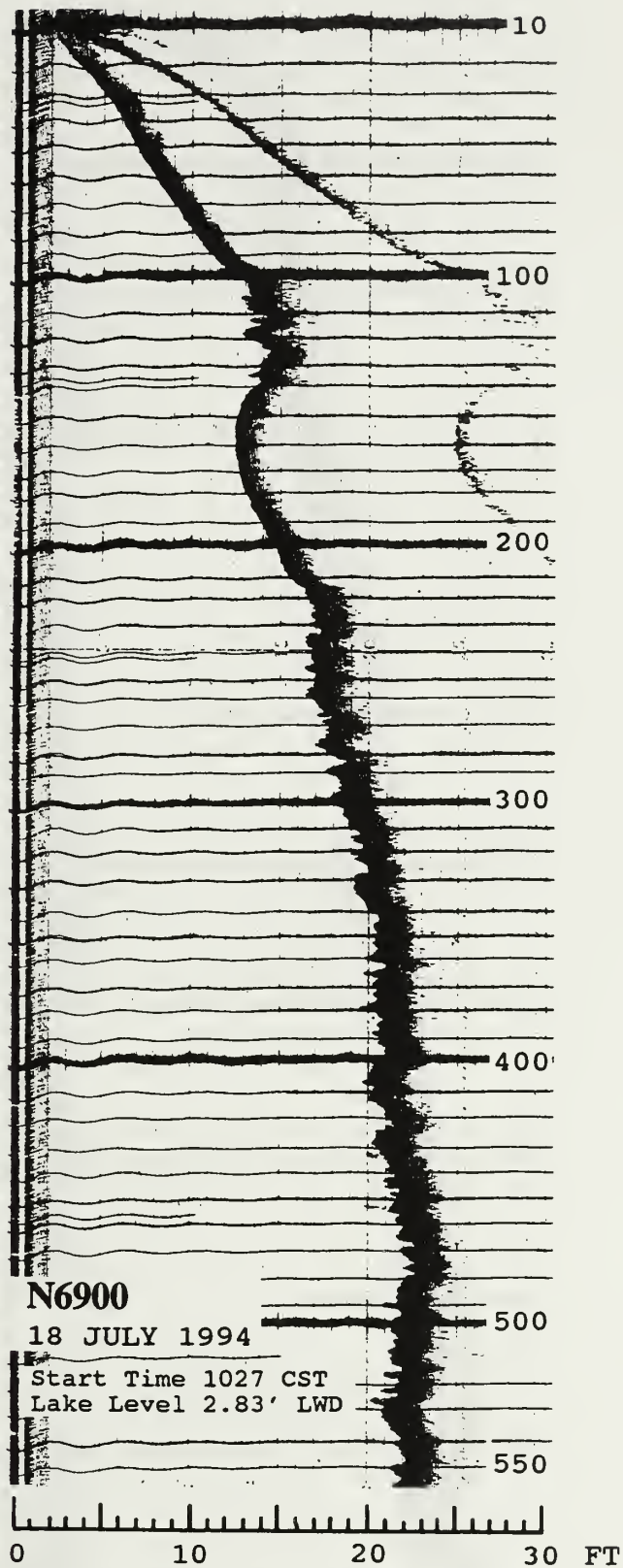
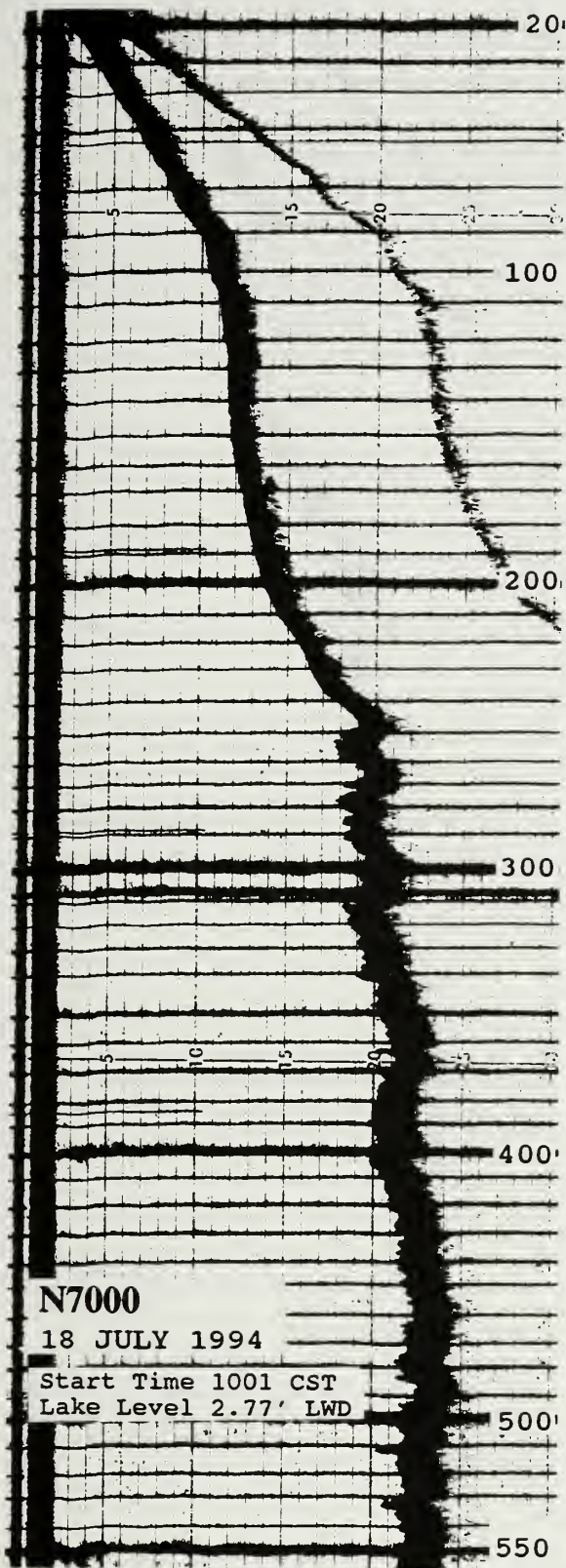






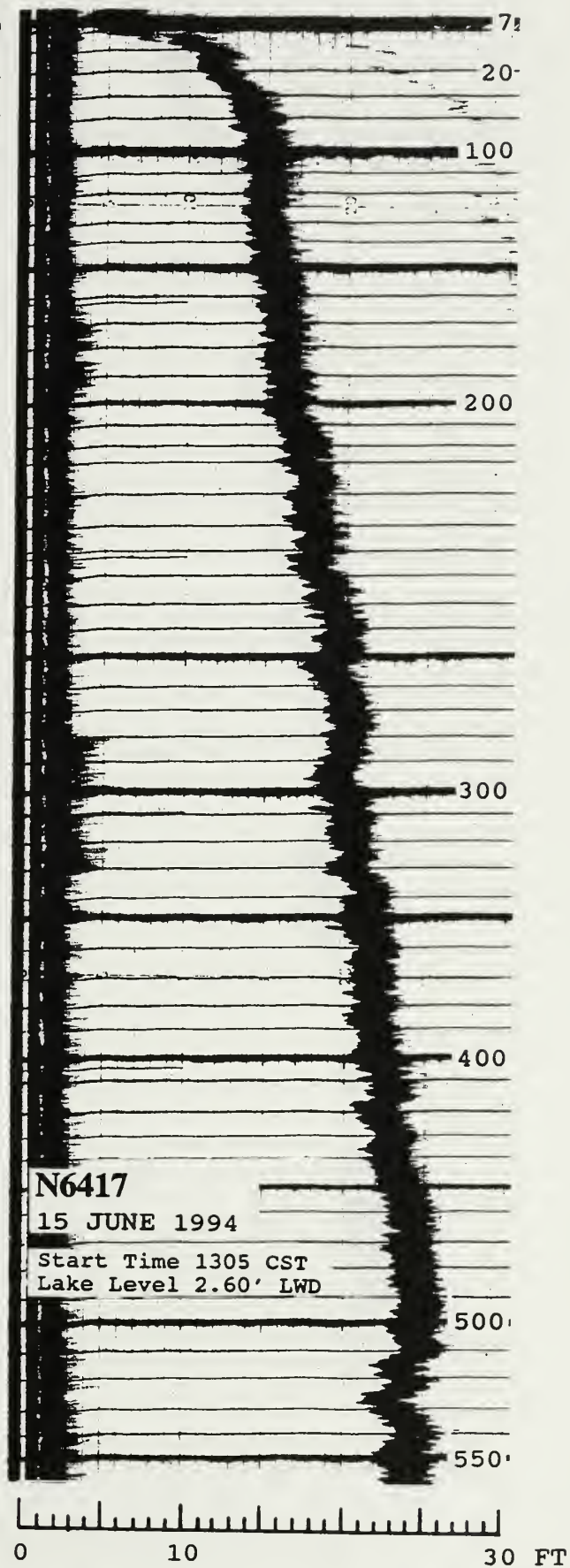
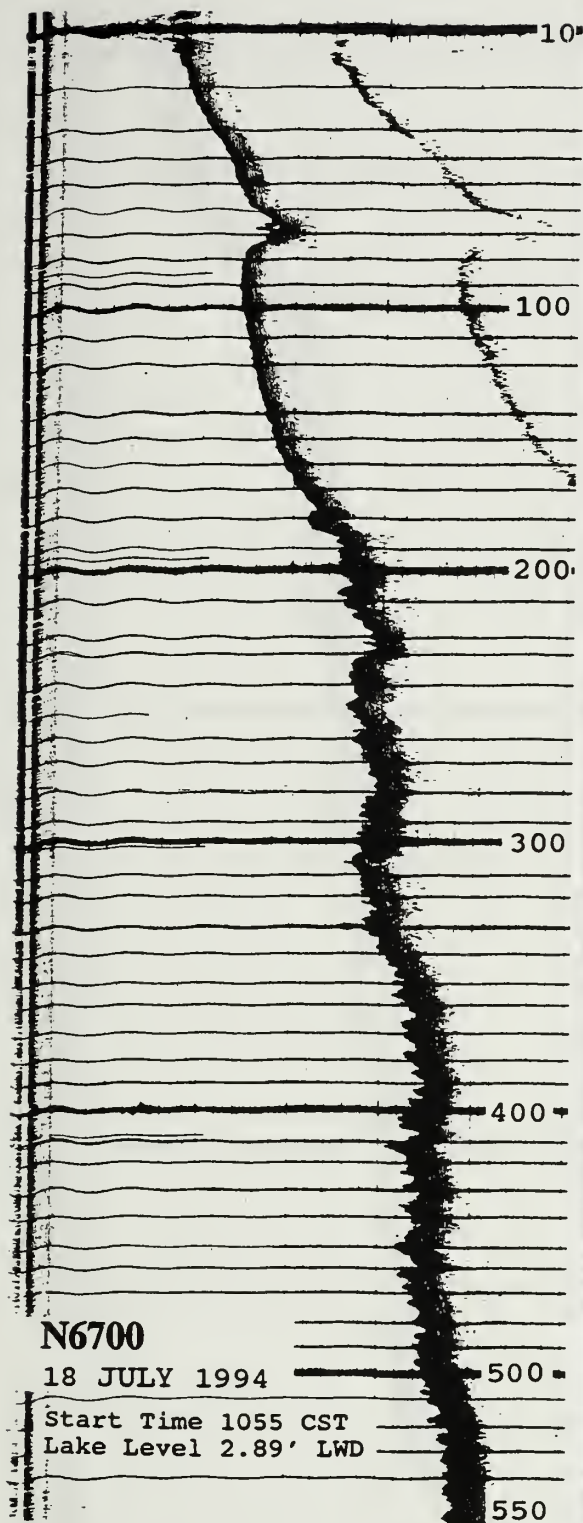




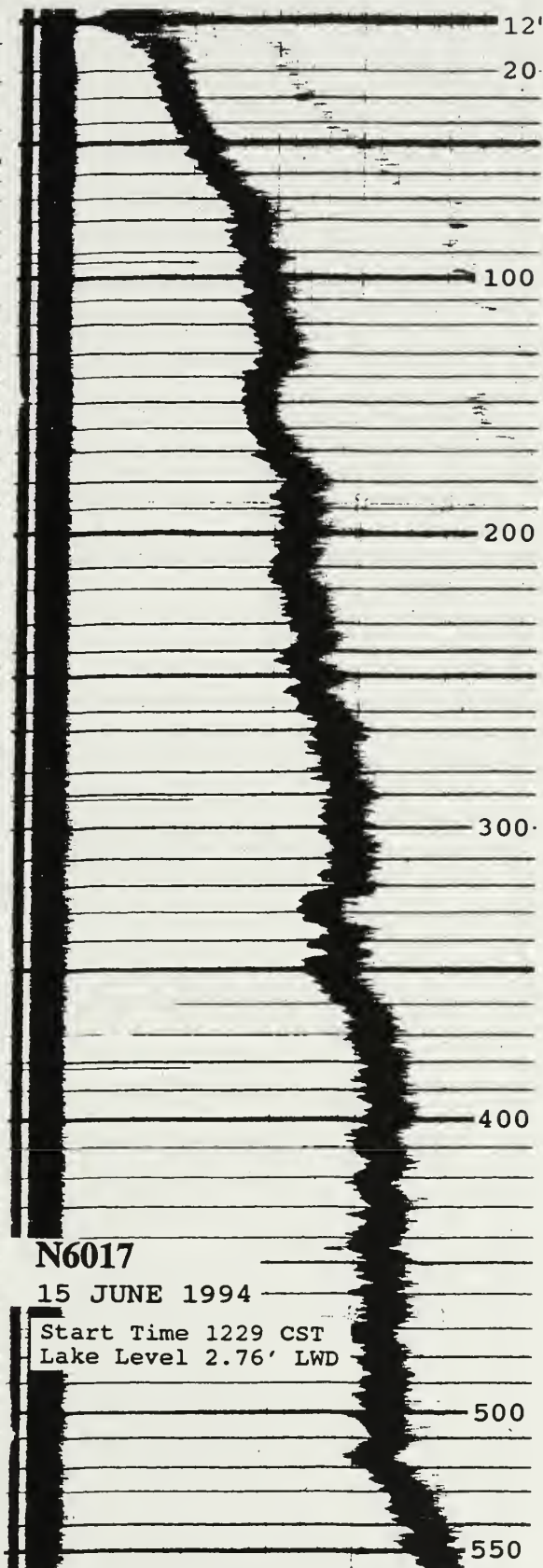
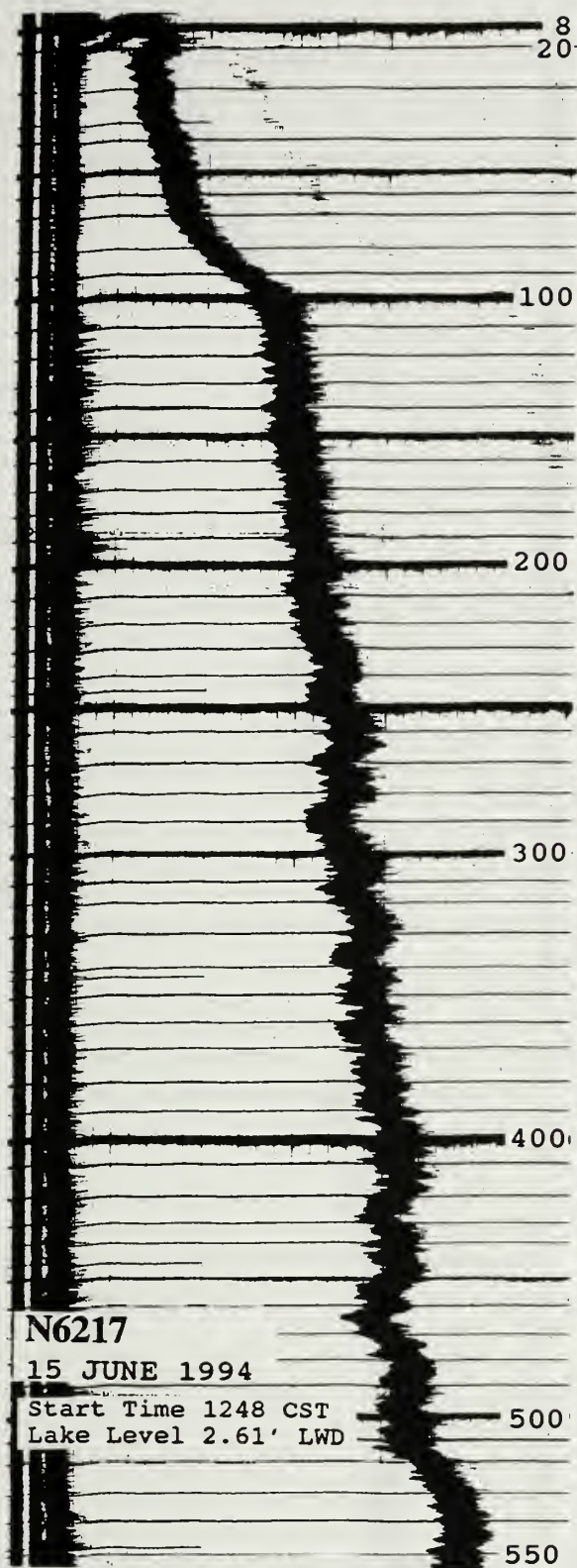








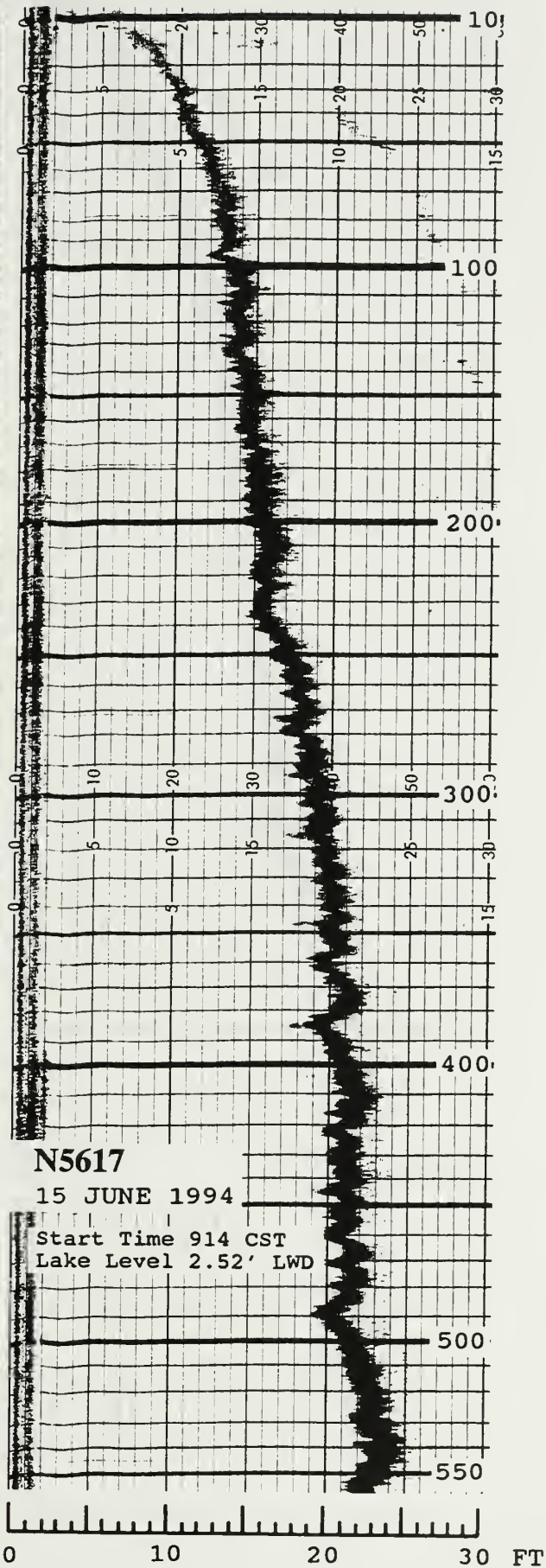
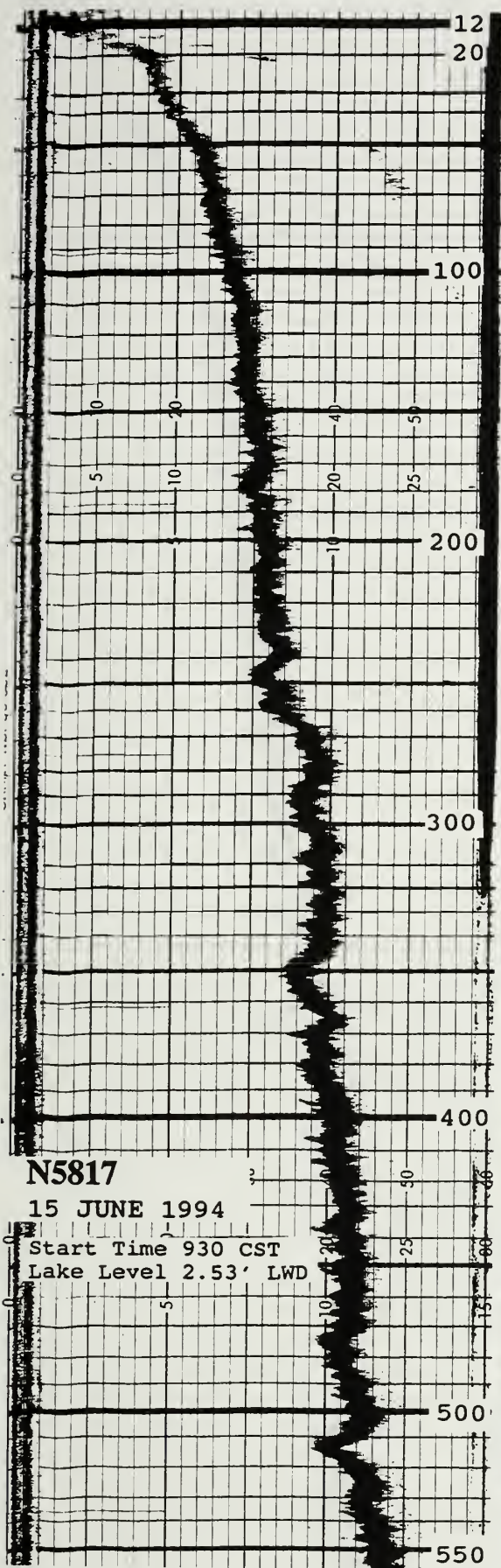




0 10 20 30 FT

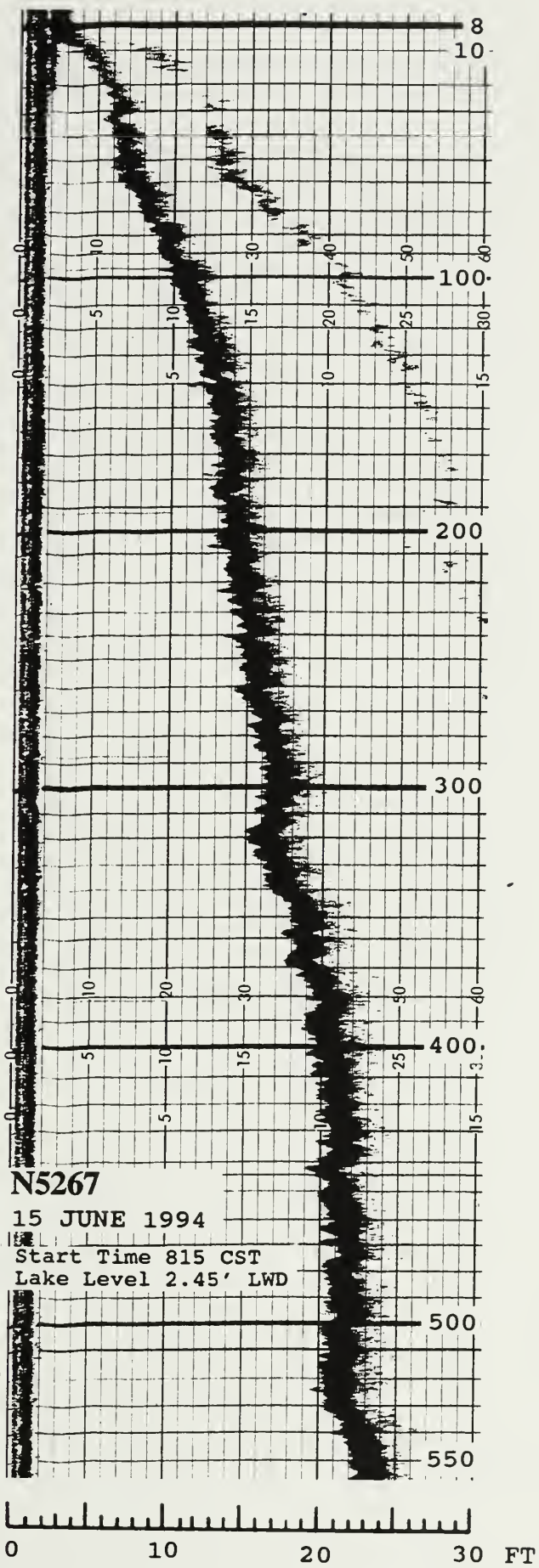
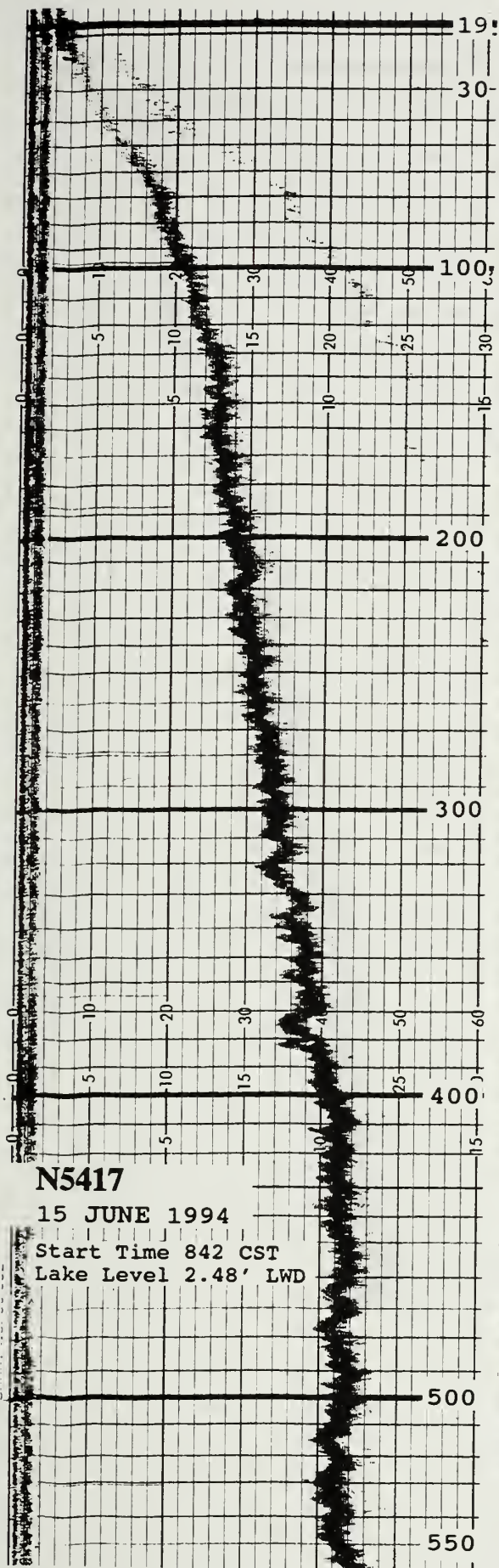




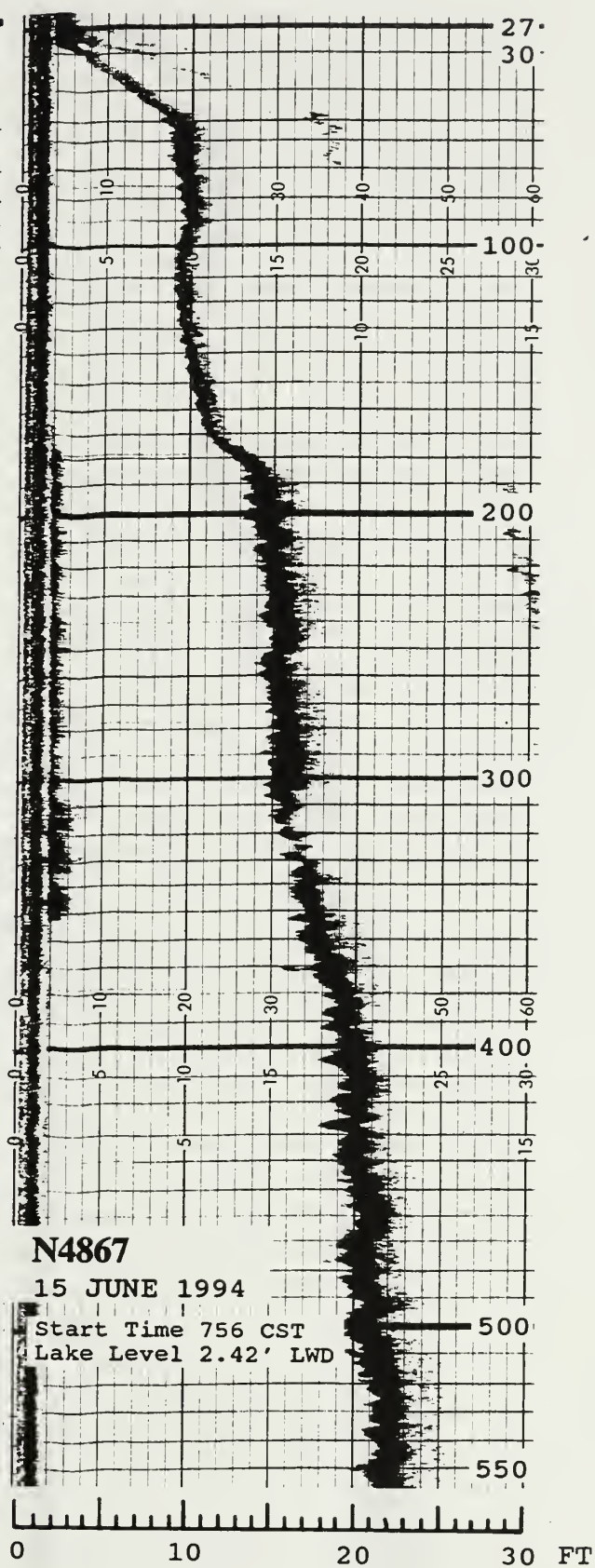
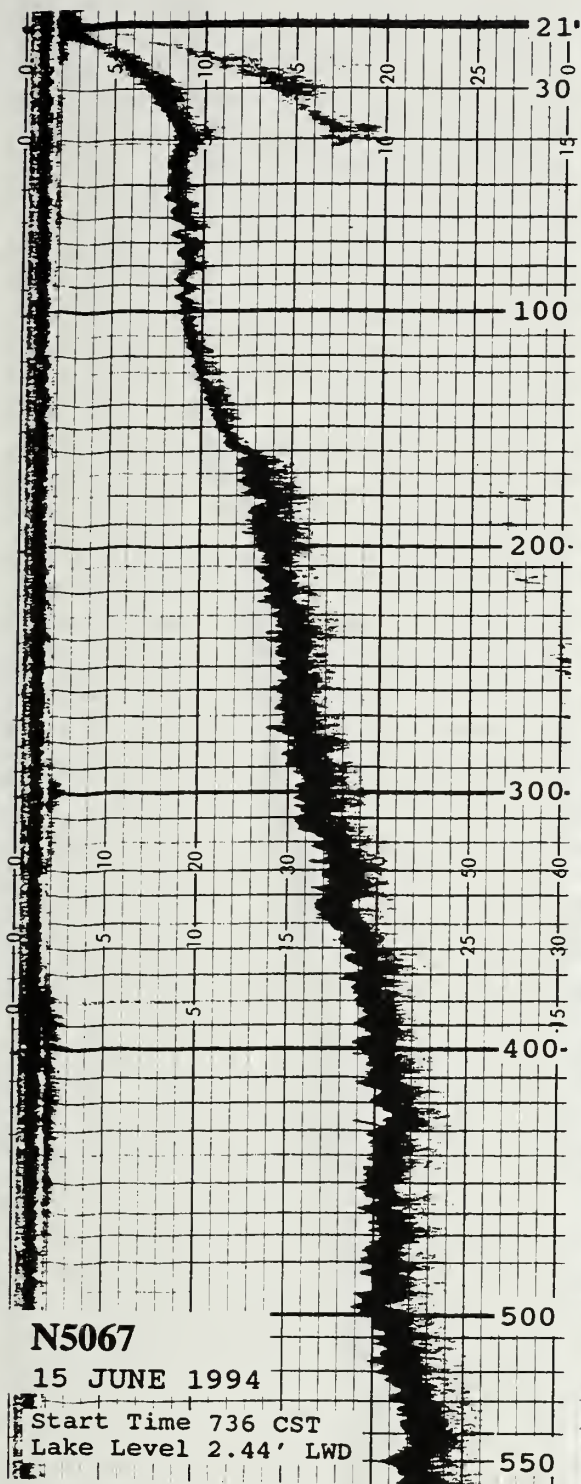








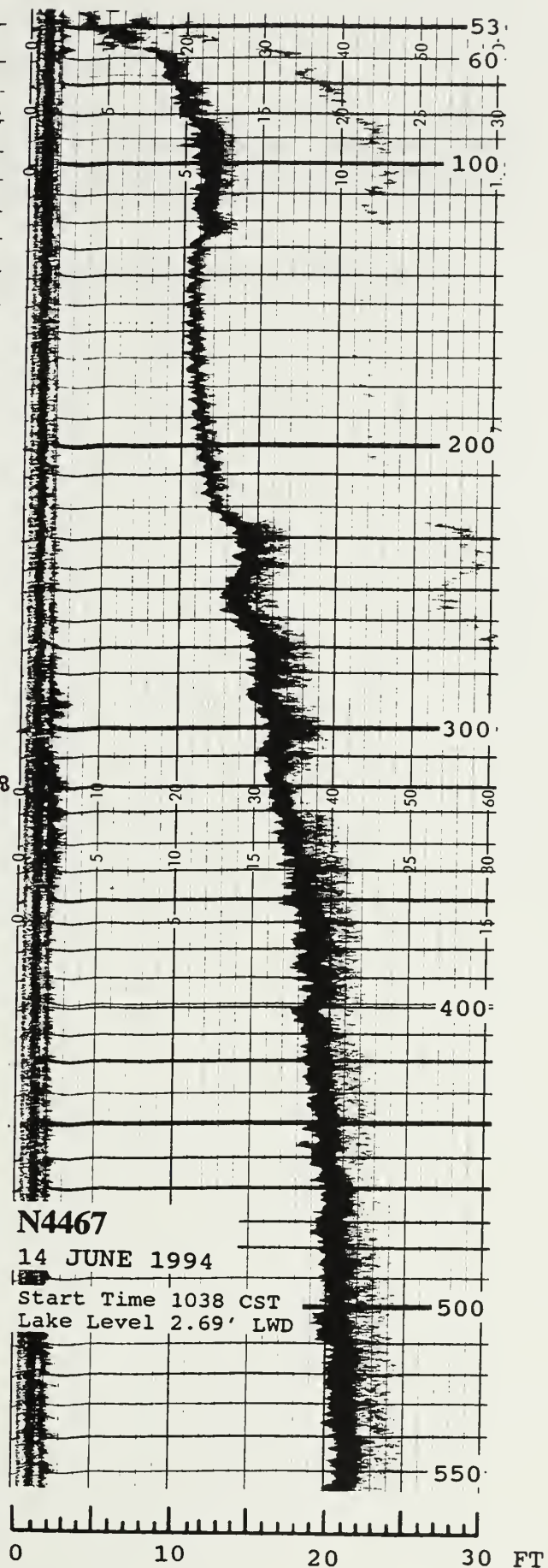
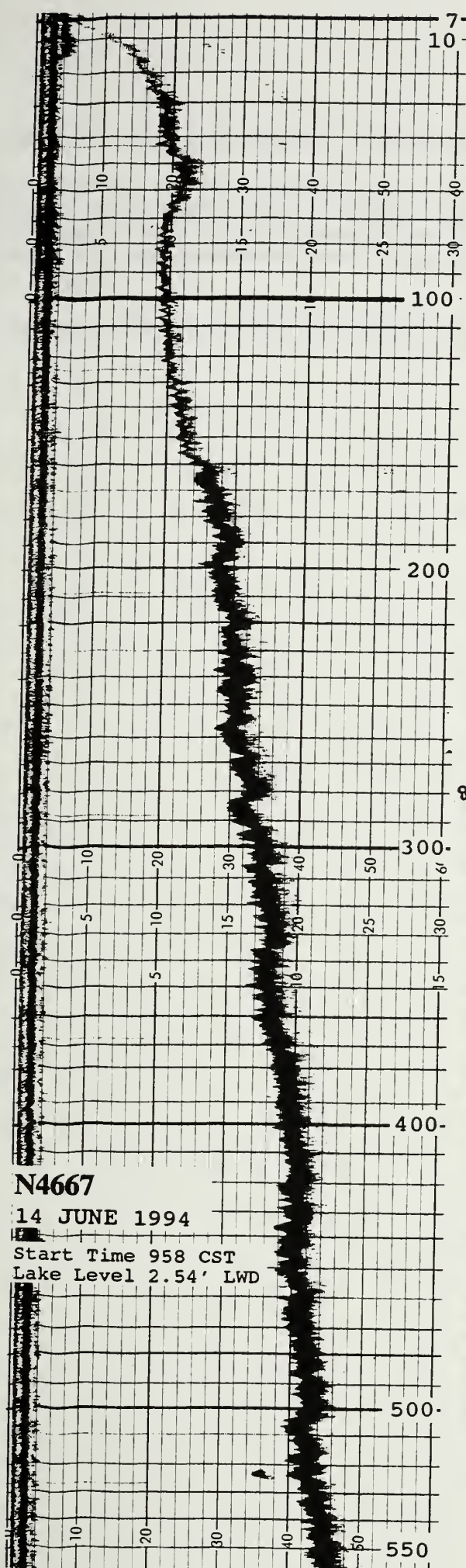














## **APPENDIX B ISGS JUNE AND JULY 1994 LONG PROFILES**

Dates on profiles are for the fathometer profiling. The prism-pole profiling across the beach and shallow nearshore was done within 1 week, most within 1 day, after the fathometer profiling. Prism-pole profiling was repeated on Profiles N5417 through N6217 on August 3, approximately 1 ½ months after fathometer profiling. This was required because of the loss of profile data during transfer from the electronic notebook to a computer.

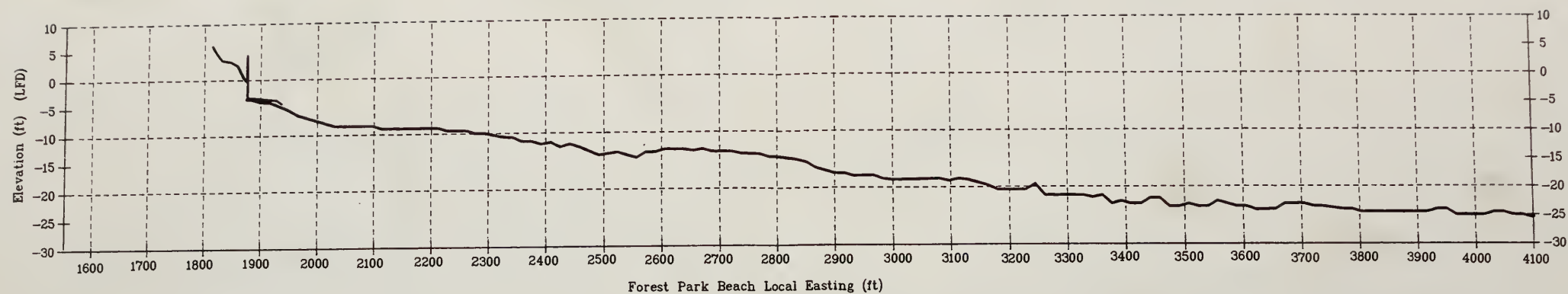
Elevations are referenced to Lake Forest Datum (LFD). Vertical exaggeration for all profiles is 10x.



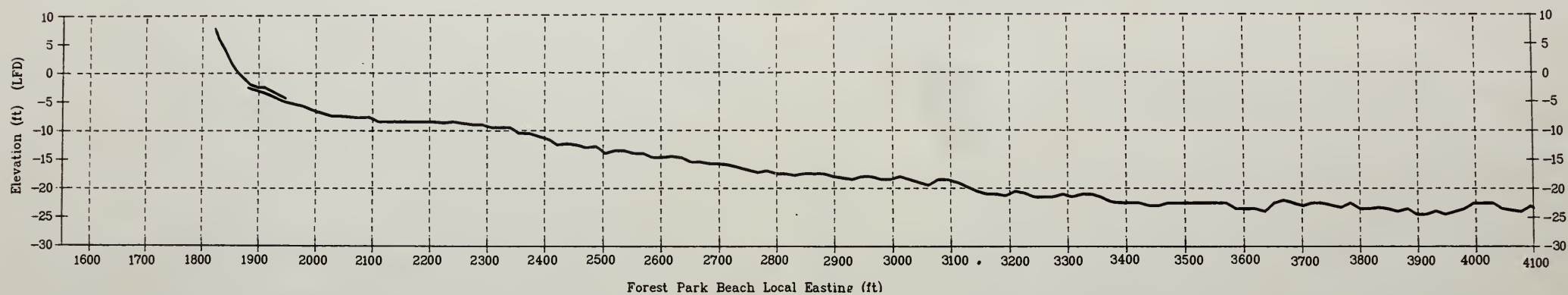




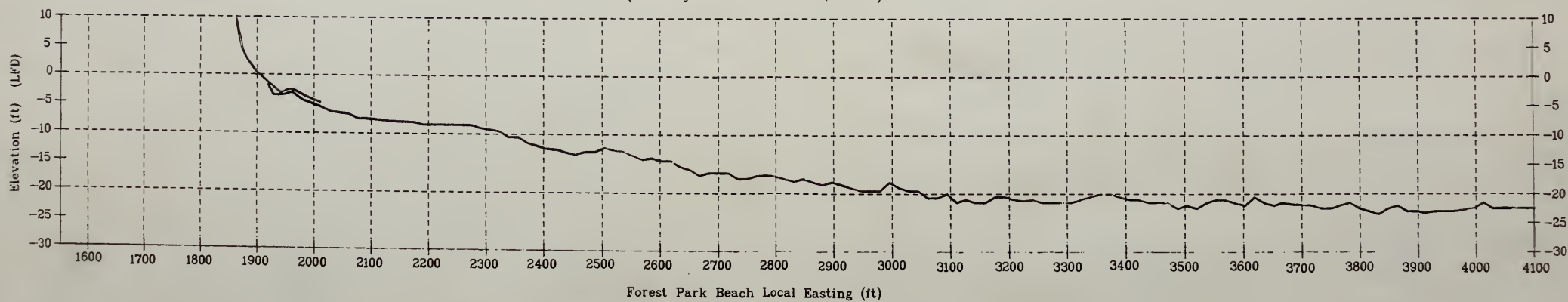
N 9430 (Survey Data: June 16, 1994)



N 9230 (Survey Data: June 16, 1994)

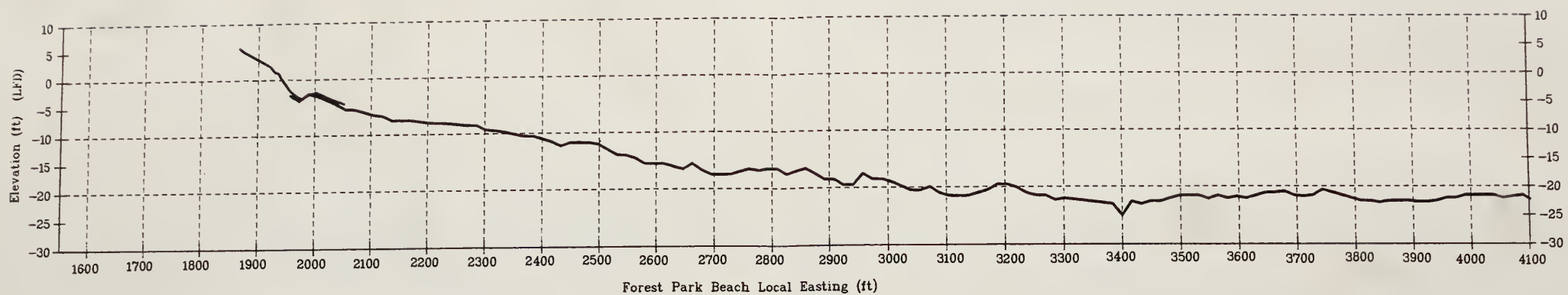


N 9030 (Survey Date: June 16, 1994)

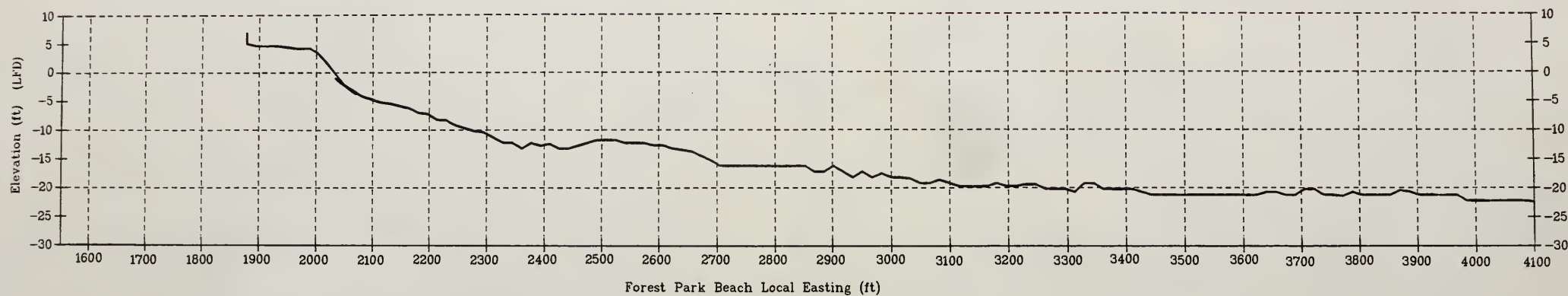




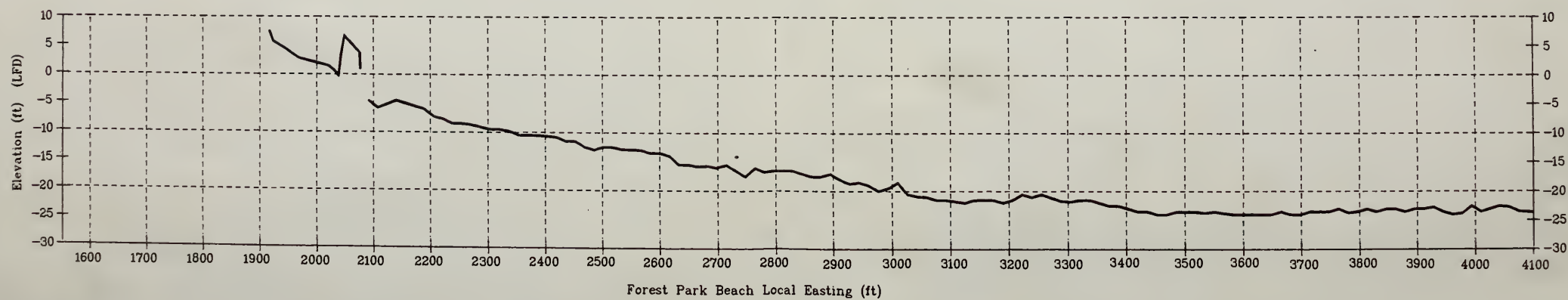
N 8830 (Survey Date: June 16, 1994)



N 8630 (Survey Date: June 16, 1994)

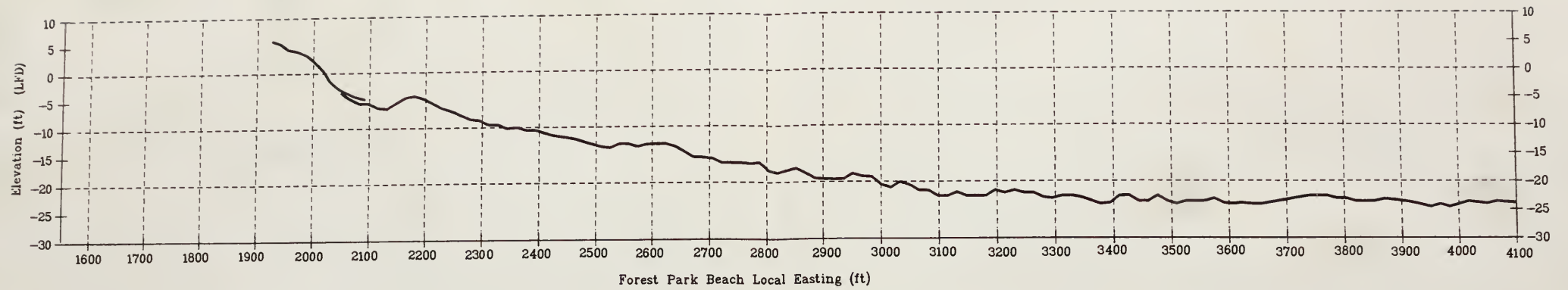


N 8430 (Survey Date: June 16, 1994)

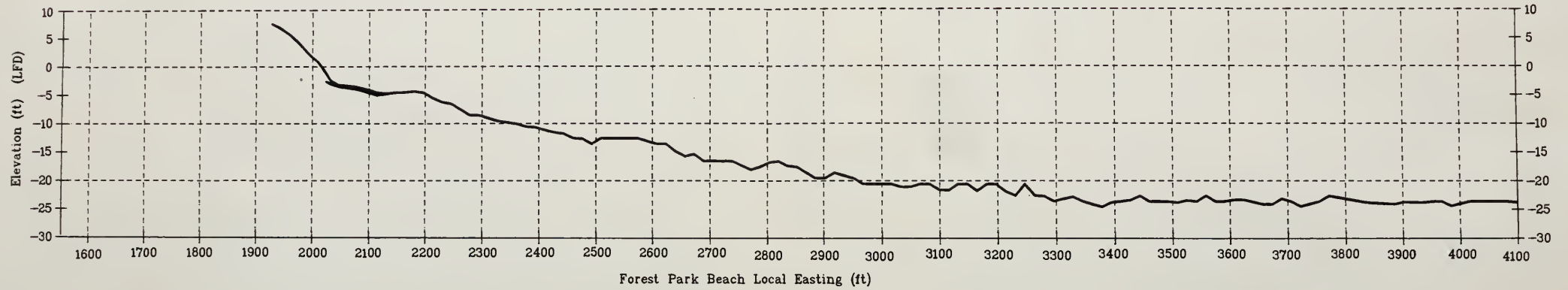




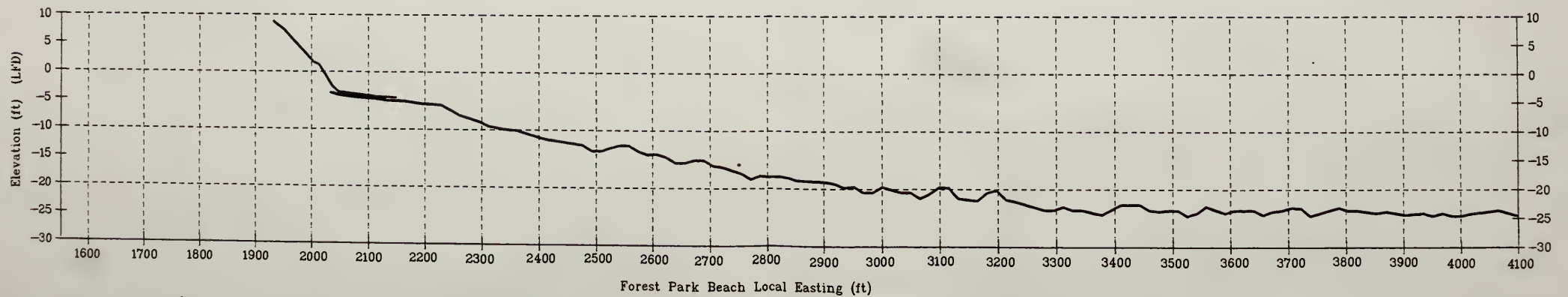
N 8300 (Survey Data: June 16, 1994)



N 8230 (Survey Data: June 16, 1994)



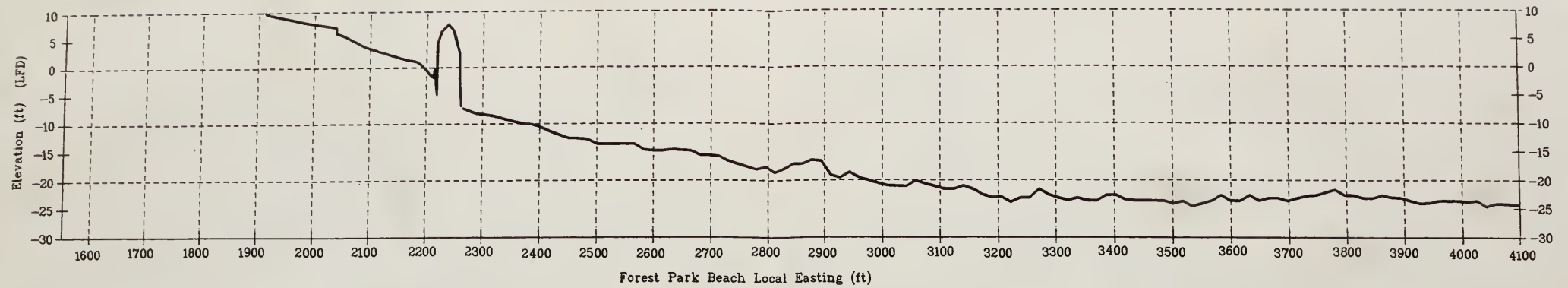
N 8200 (Survey Data: June 16, 1994)



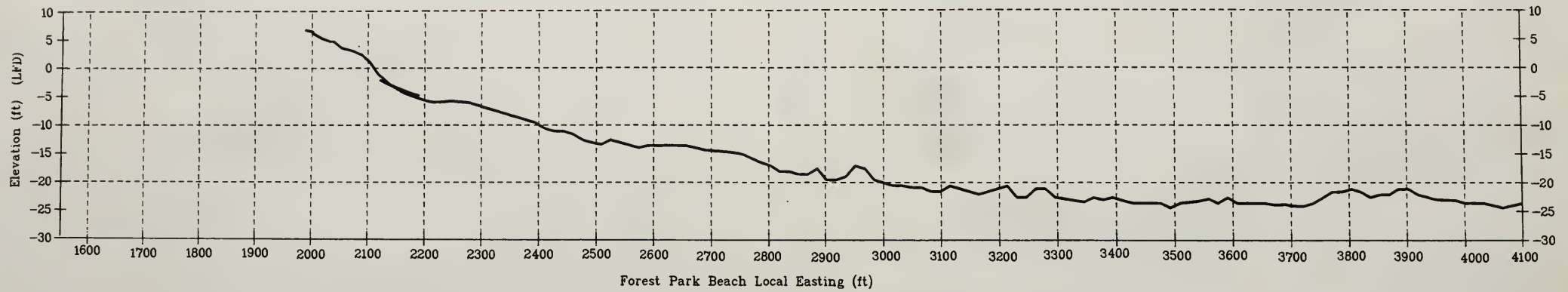




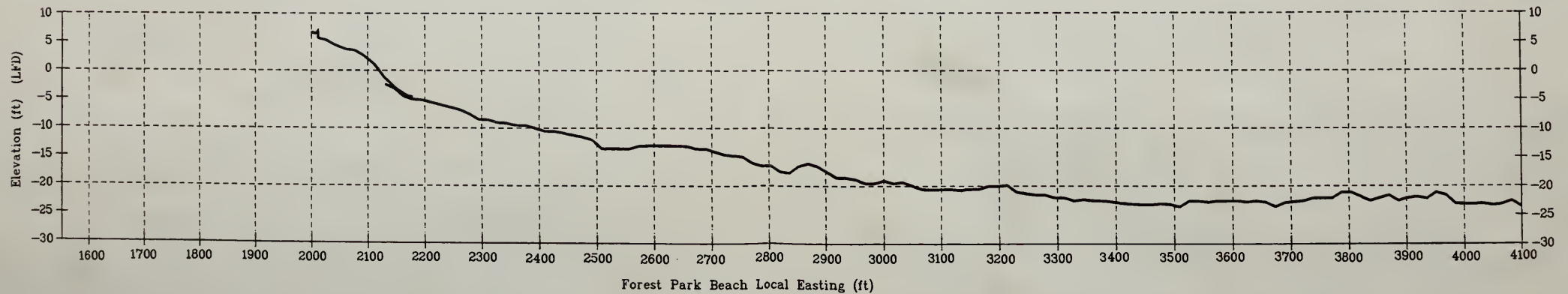
N 8030 (Survey Data June 16, 1994)



N 7850 (Survey Data June 16, 1994)

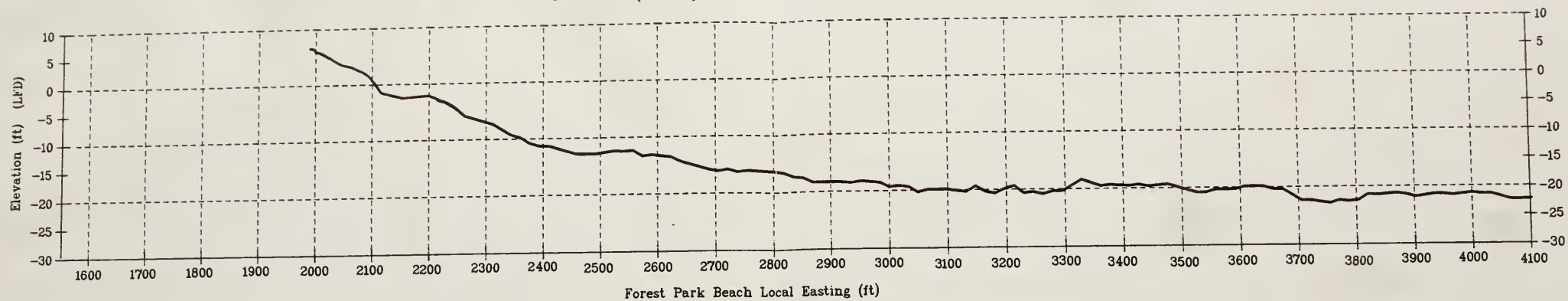


N 7750 (Survey Data June 16, 1994)

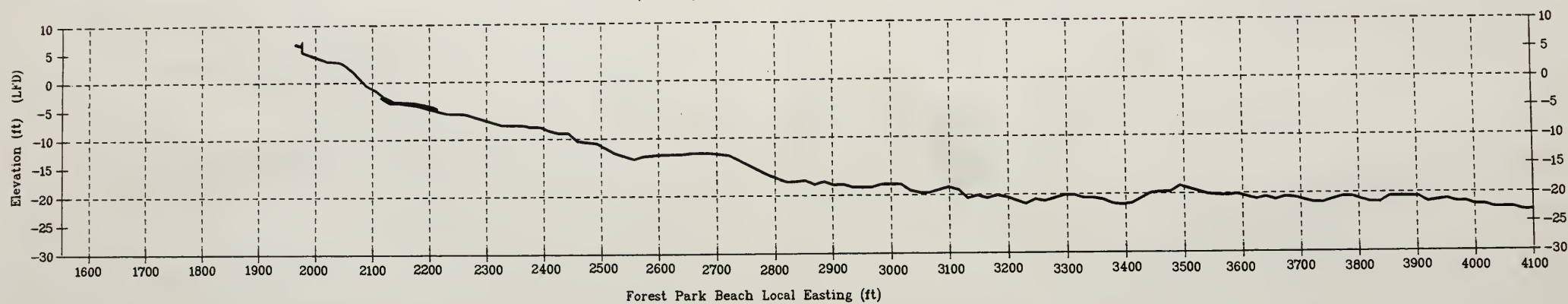




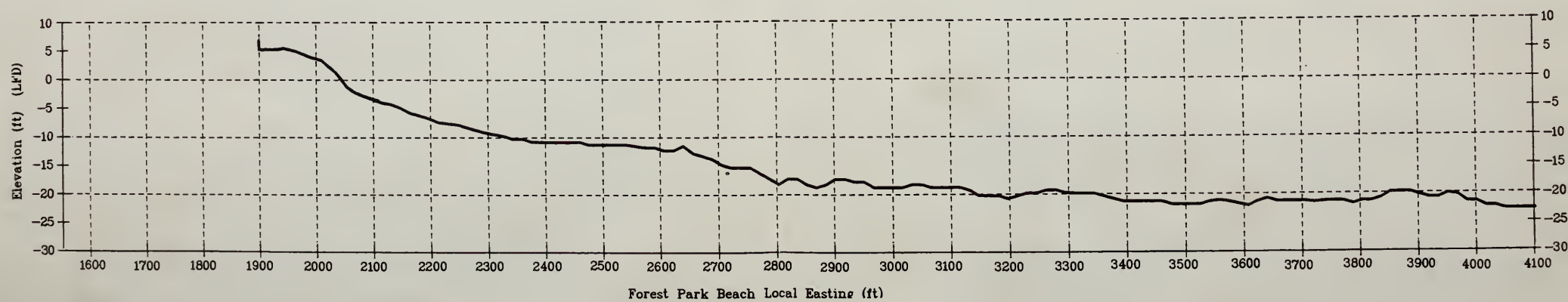
N 7450 (Survey Data: June 14, 1994)



N 7350 (Survey Data: June 16, 1994)



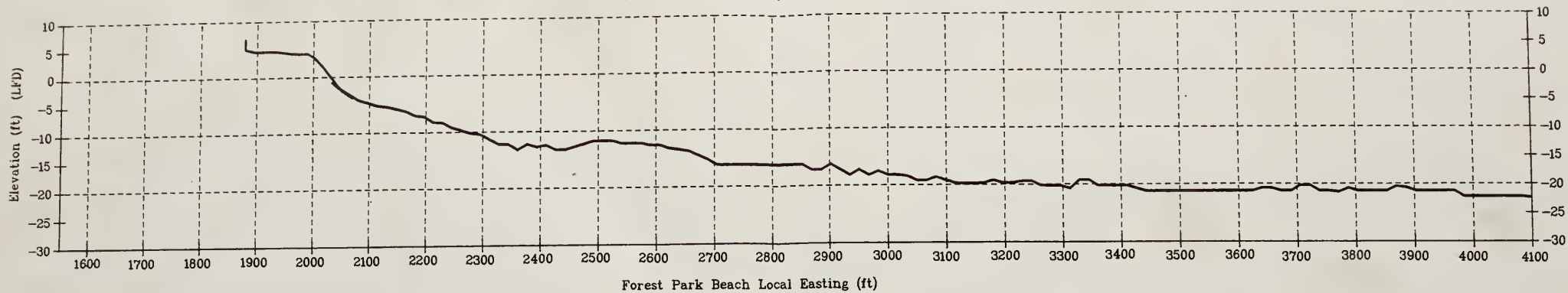
N 7000 (Survey Data: July 18, 1994)



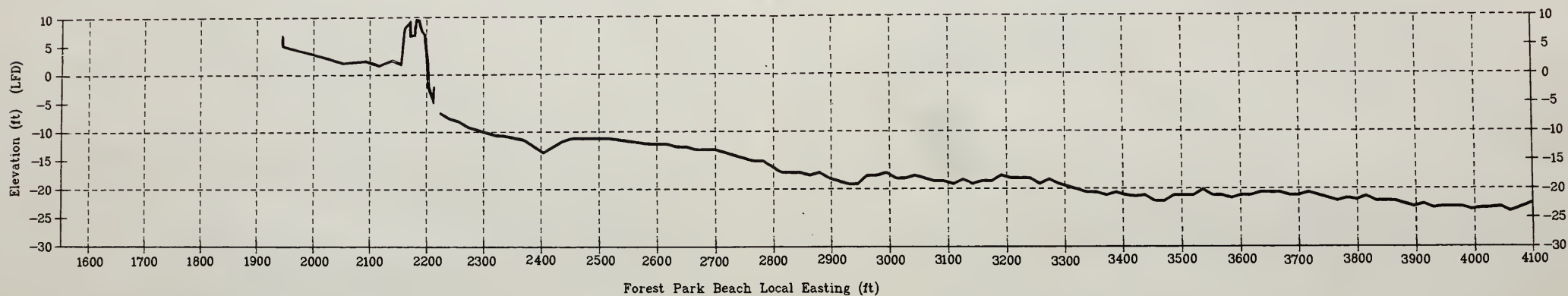




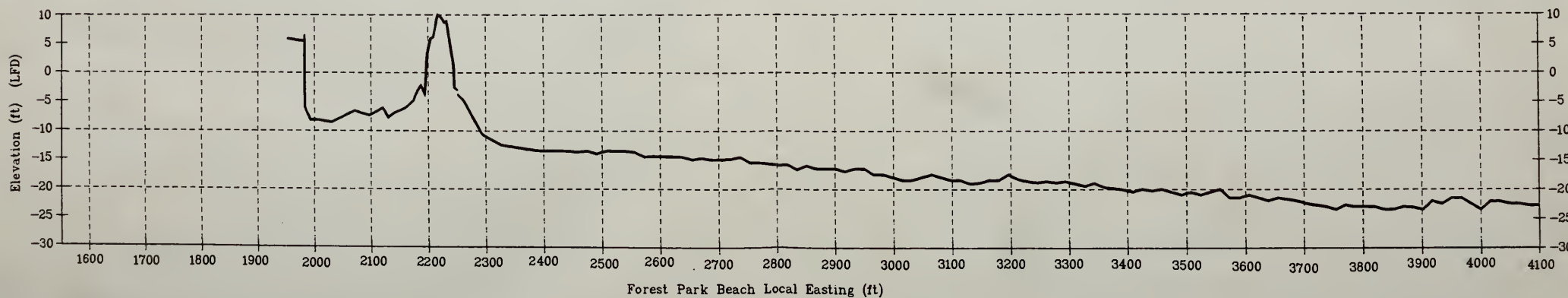
N 6900 (Survey Date: July 18, 1994)



N 6700 (Survey Date: July 18, 1994)

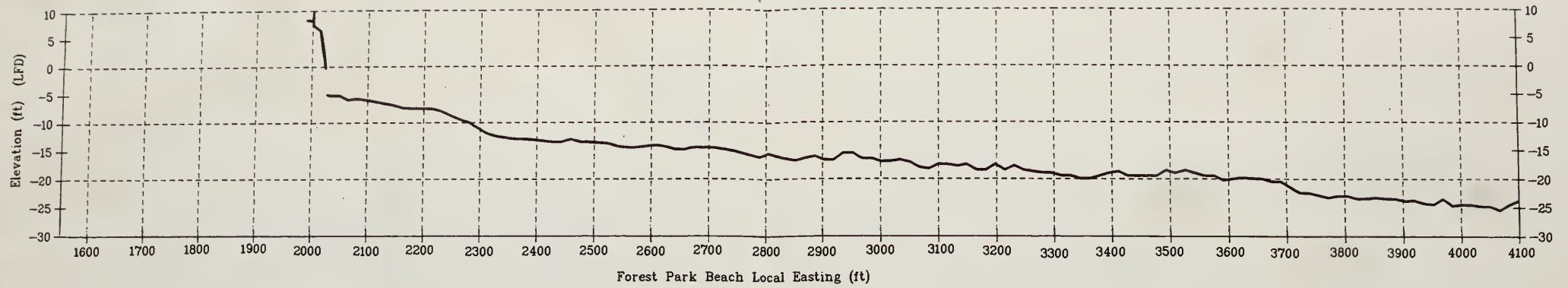


N 6417 (Survey Date: June 15, 1994)

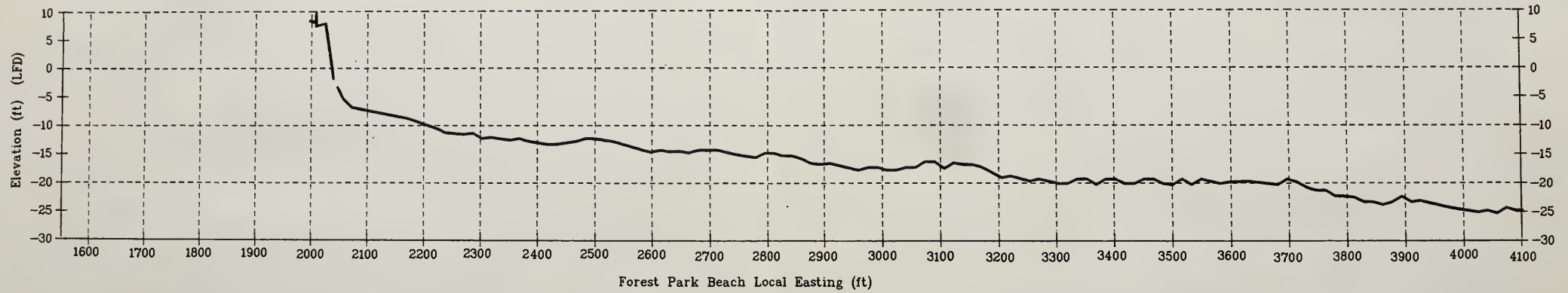




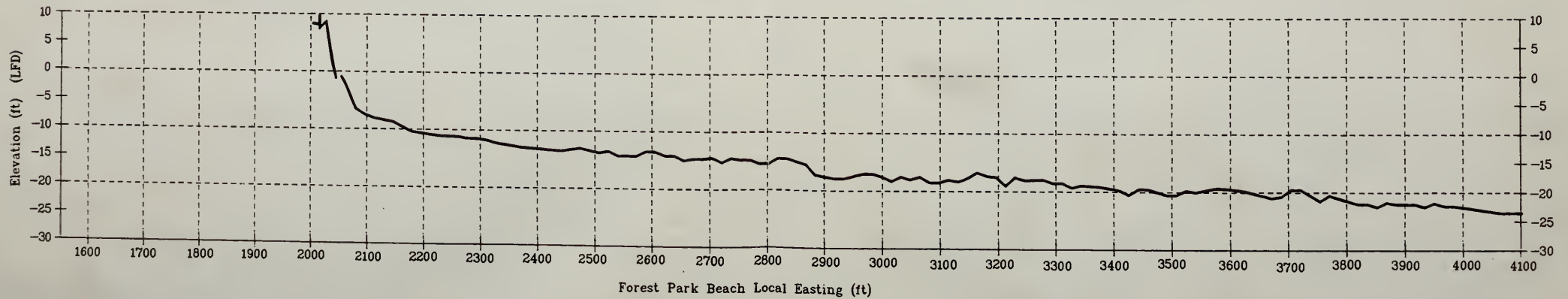
N 6217 (Survey Data: June 15, 1994)



N 6017 (Survey Data: June 15, 1994)

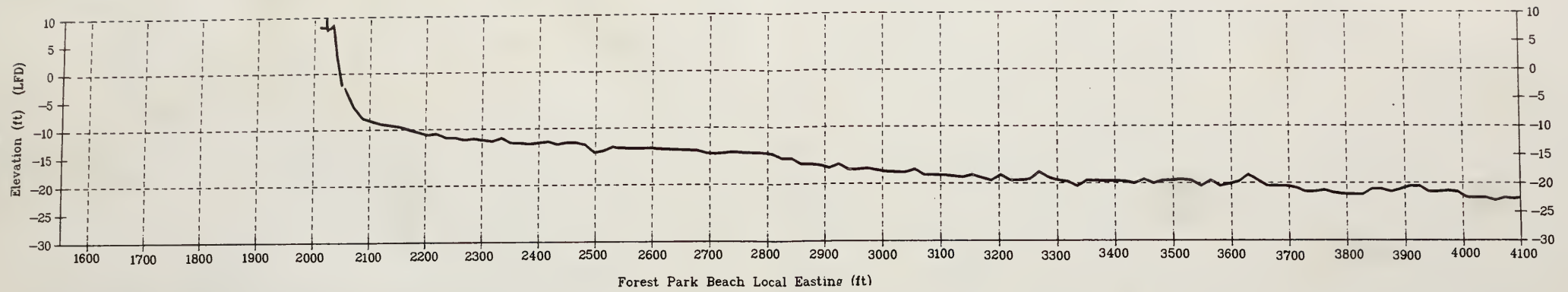


N 5817 (Survey Data: June 15, 1994)

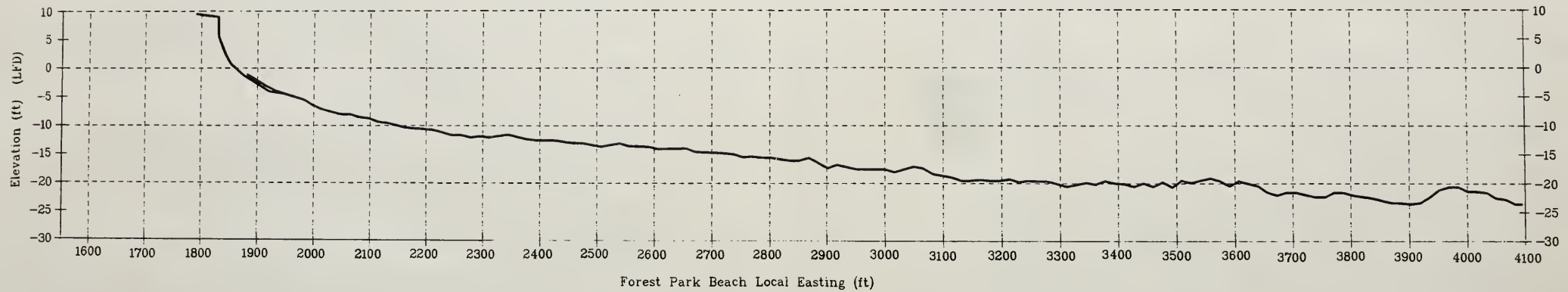




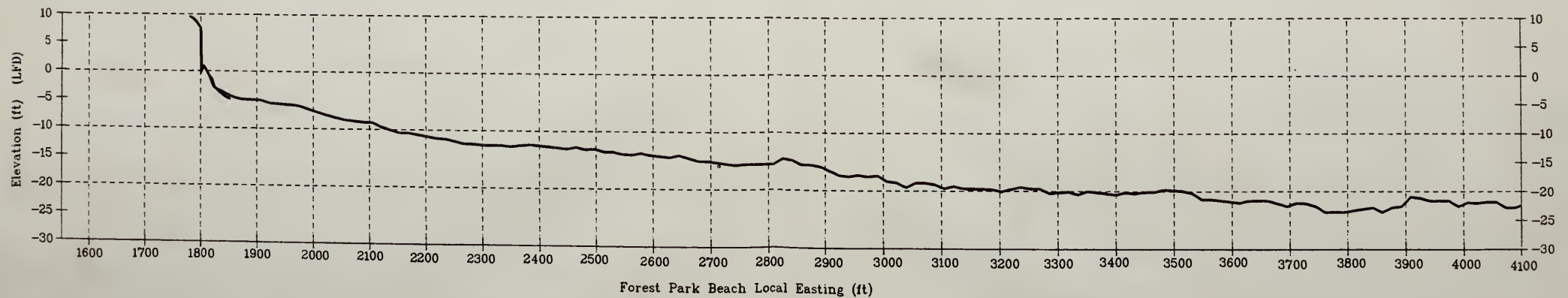
N 5617 (Survey Date: June 15, 1994)



N 5417 (Survey Date: June 15, 1994)



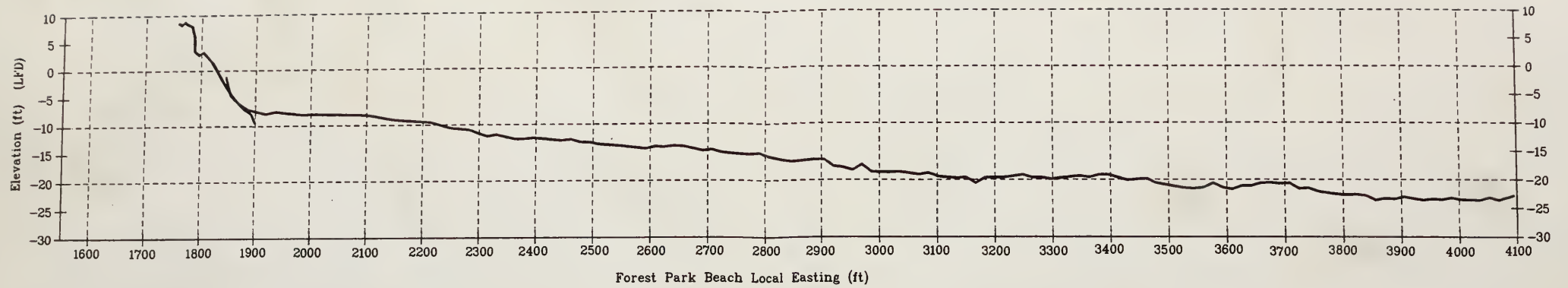
N 5267 (Survey Date: June 15, 1994)



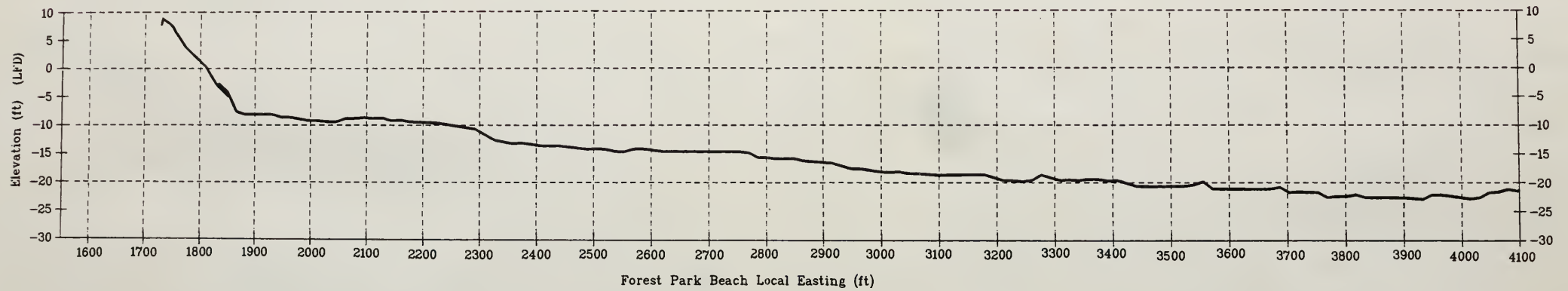




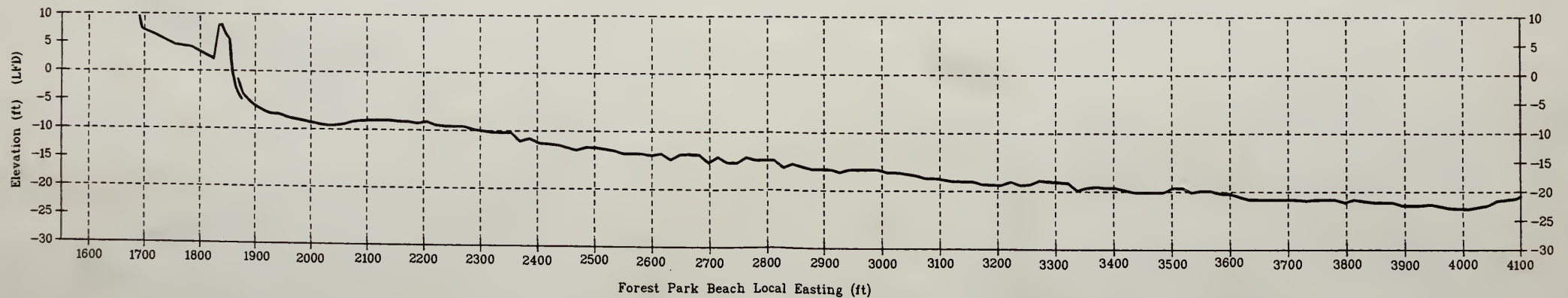
N 5067 (Survey Data June 15, 1994)



N 4867 (Survey Data June 15, 1994)

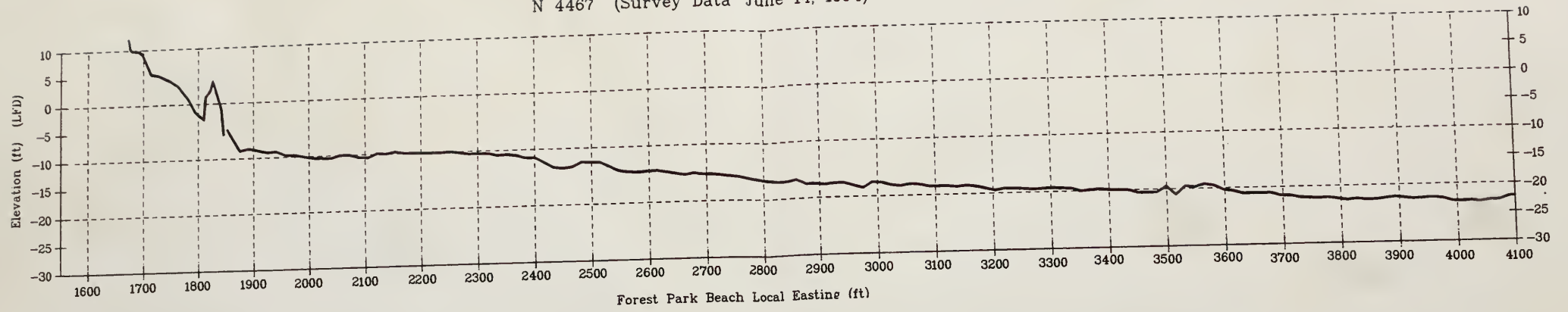


N 4667 (Survey Data June 14, 1994)





N 4467 (Survey Data June 14, 1994)



## **APPENDIX C COMPARISON OF ISGS AND CITY OF LAKE FOREST 1994 BEACH AND NEARSHORE (SHORT) PROFILES**

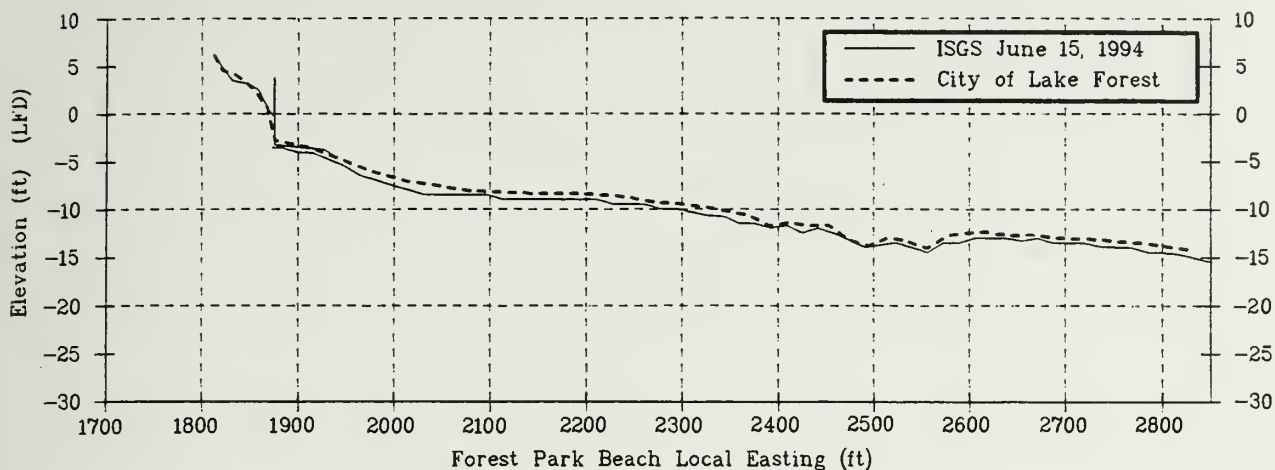
These profiles compare the 1994 ISGS short profile data, which duplicated lines run by the City of Lake Forest. All City of Lake Forest data were collected with prism pole and total station. ISGS data were collected with prism pole and total station to a depth of about 5 ft LFD. Beyond this depth, ISGS data are from fathometer records. In terms of vertical accuracy, the City of Lake Forest prism-pole data take precedence over ISGS fathometer data.

Elevations are referenced to Lake Forest Datum (LFD). Vertical exaggeration for all profiles is 10x.

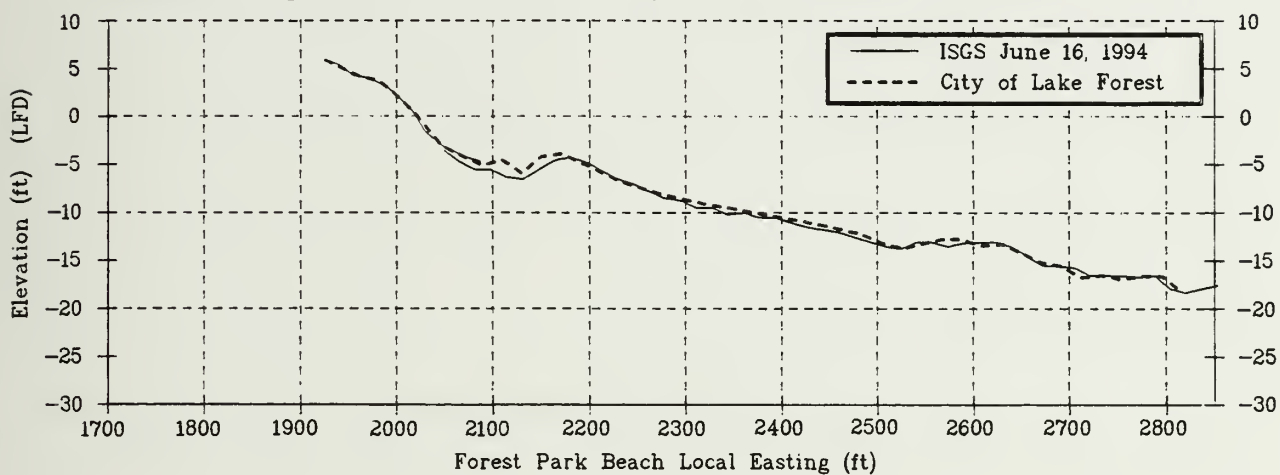




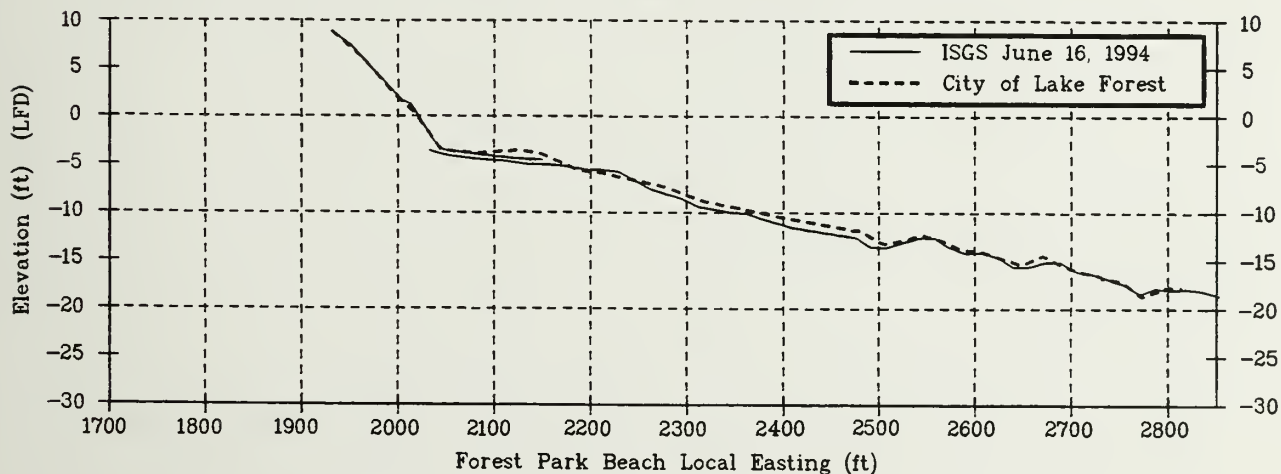
N 9430 Comparison of ISGS and City of Lake Forest 1994 Short Profiles



N 8300 Comparison of ISGS and City of Lake Forest 1994 Short Profiles

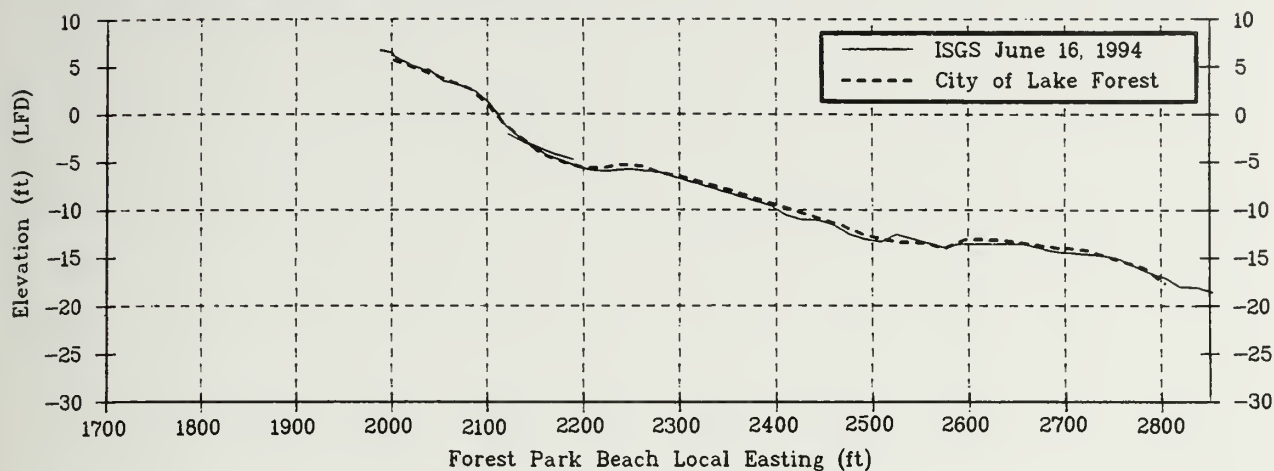


N 8200 Comparison of ISGS and Lake Forest 1994 Short Profiles

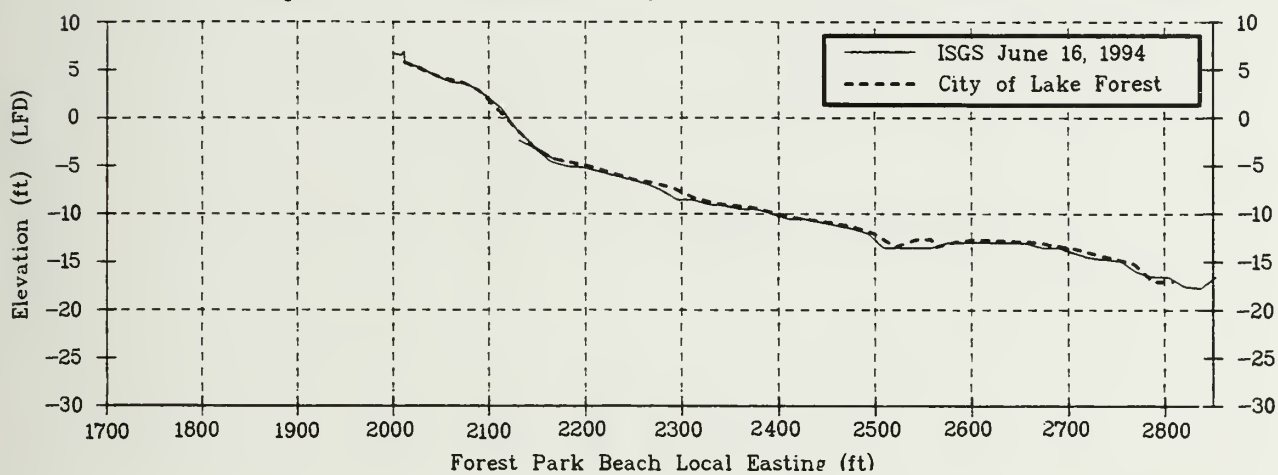




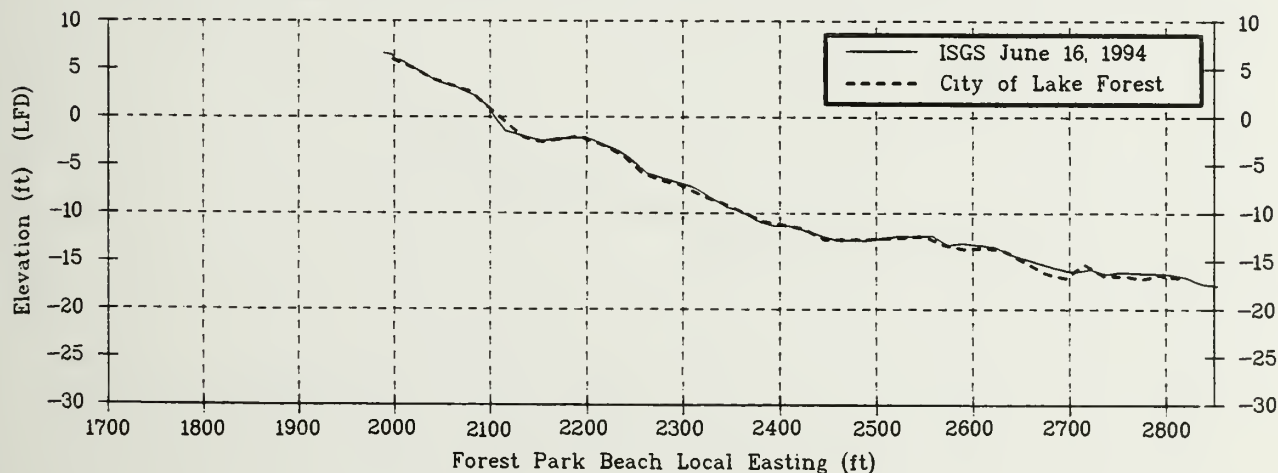
N 7850 Comparison of ISGS and City of Lake Forest 1994 Short Profiles



N 7750 Comparison of ISGS and City of Lake Forest 1994 Short Profiles



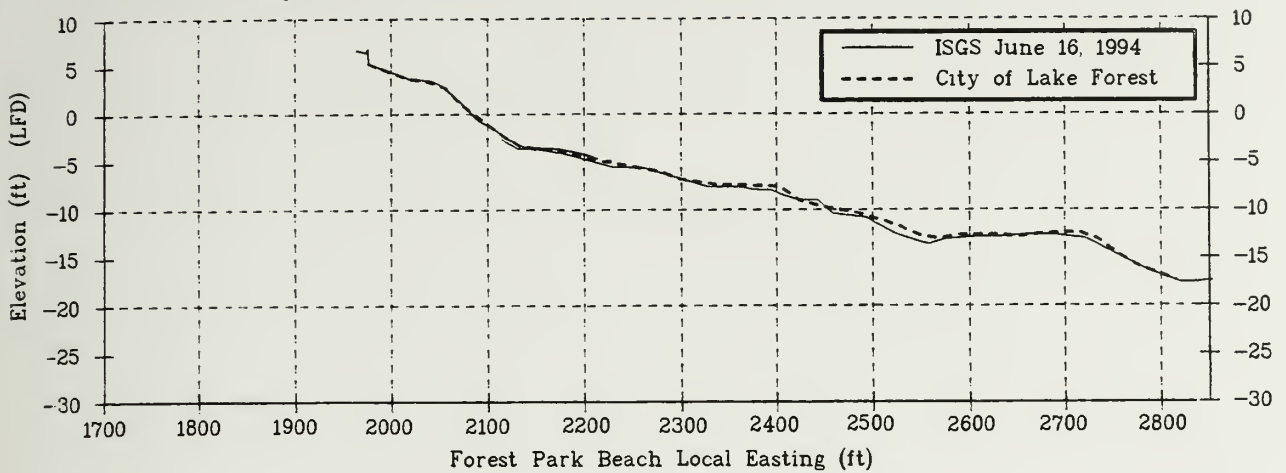
N 7450 Comparison of ISGS and Lake Forest 1994 Short Profiles



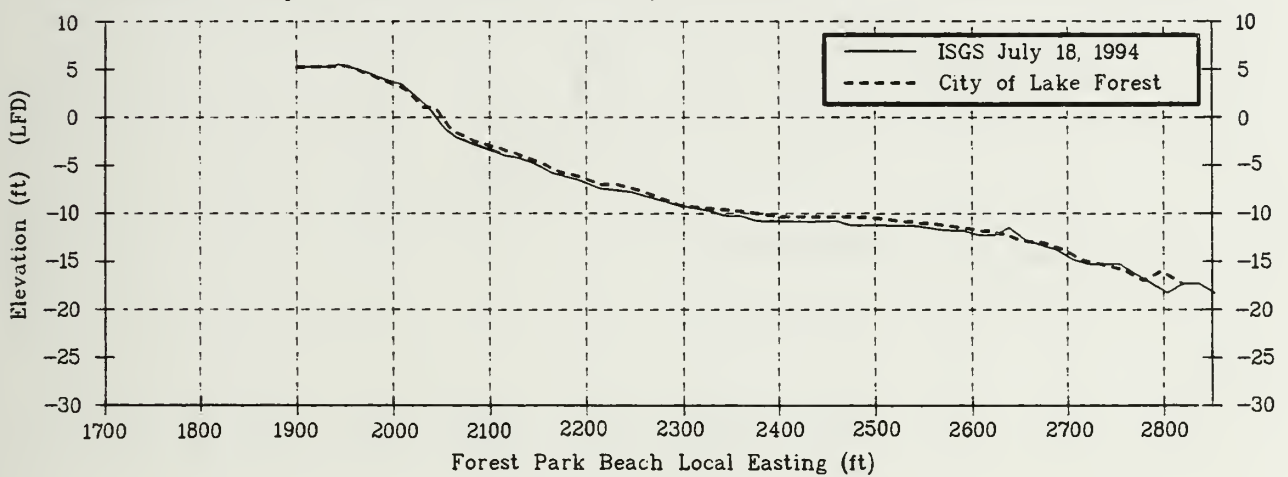




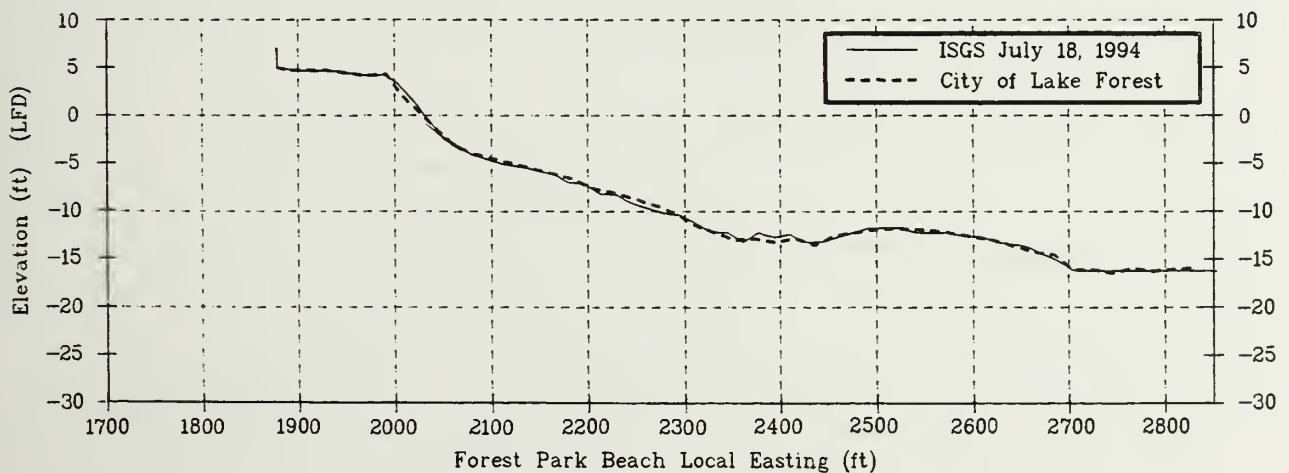
N 7350 Comparison of ISGS and City of Lake Forest 1994 Short Profiles



N 7000 Comparison of ISGS and City of Lake Forest 1994 Short Profiles

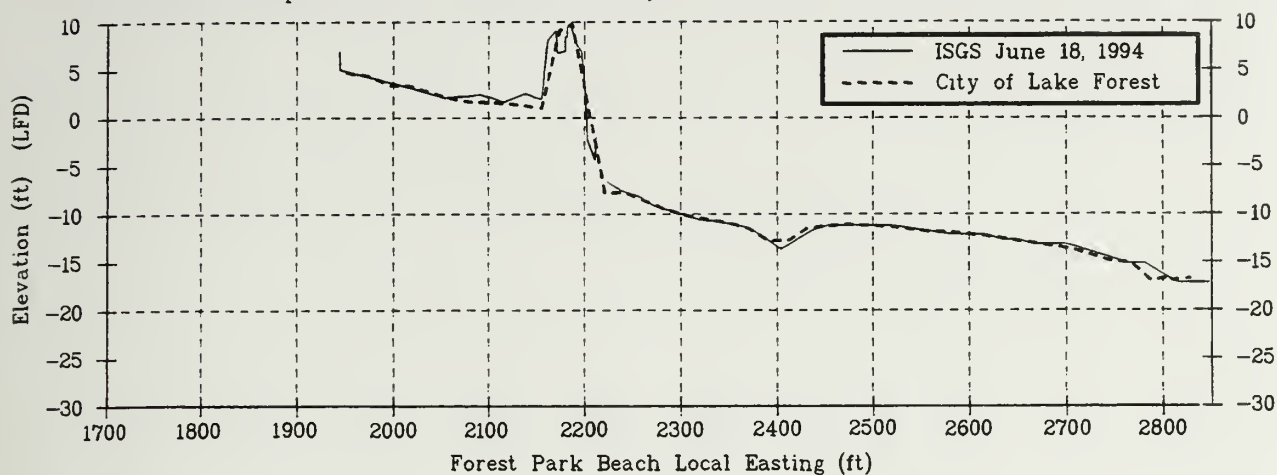


N 6900 Comparison of ISGS and City of Lakeforest 1994 Short Profiles

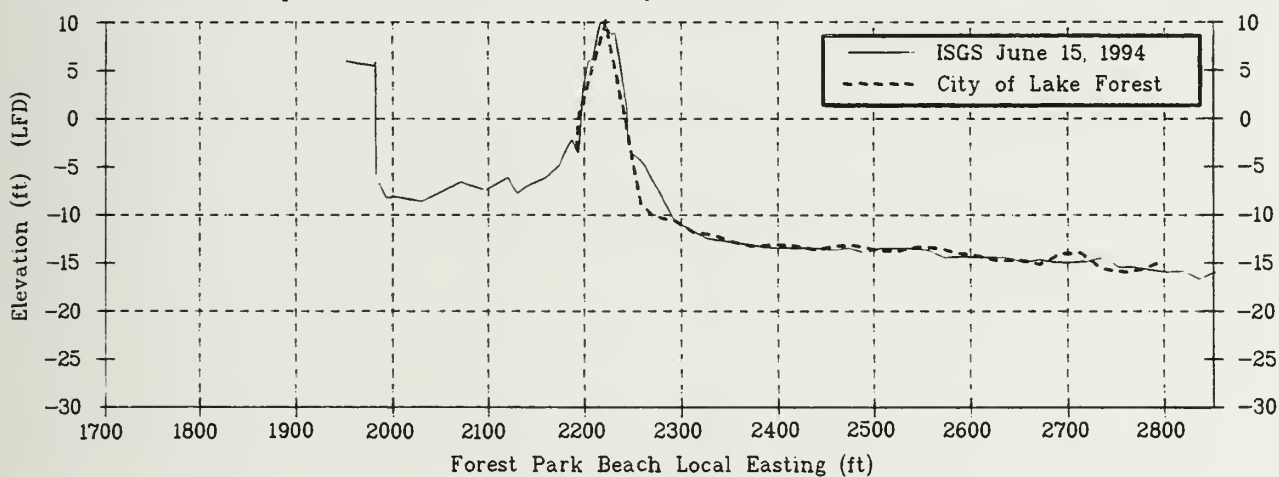




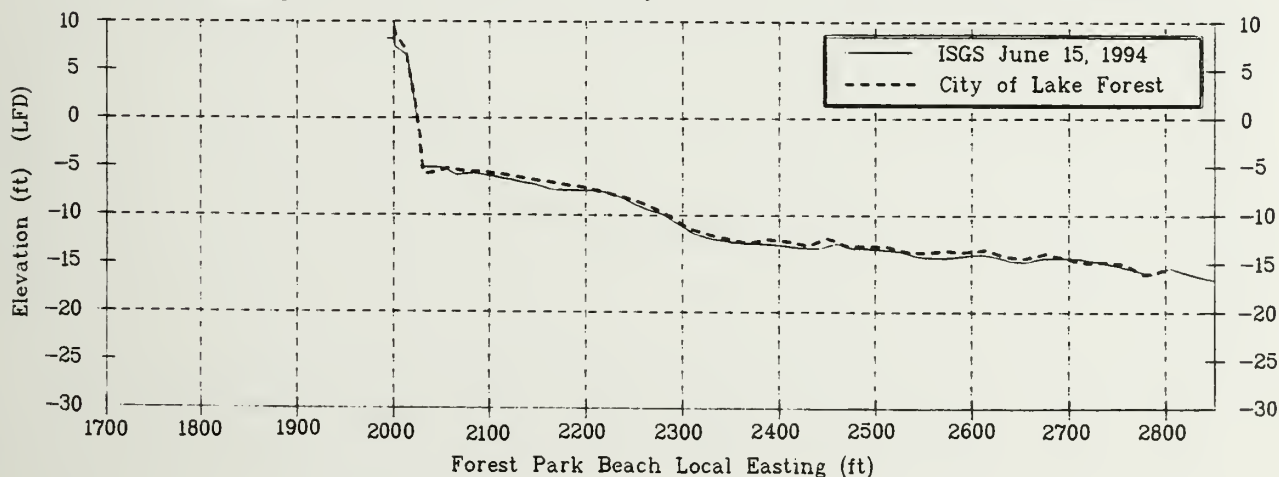
N 6700 Comparison of ISGS and City of Lake Forest 1994 Short Profiles



N 6417 Comparison of ISGS and City of Lake Forest 1994 Short Profiles

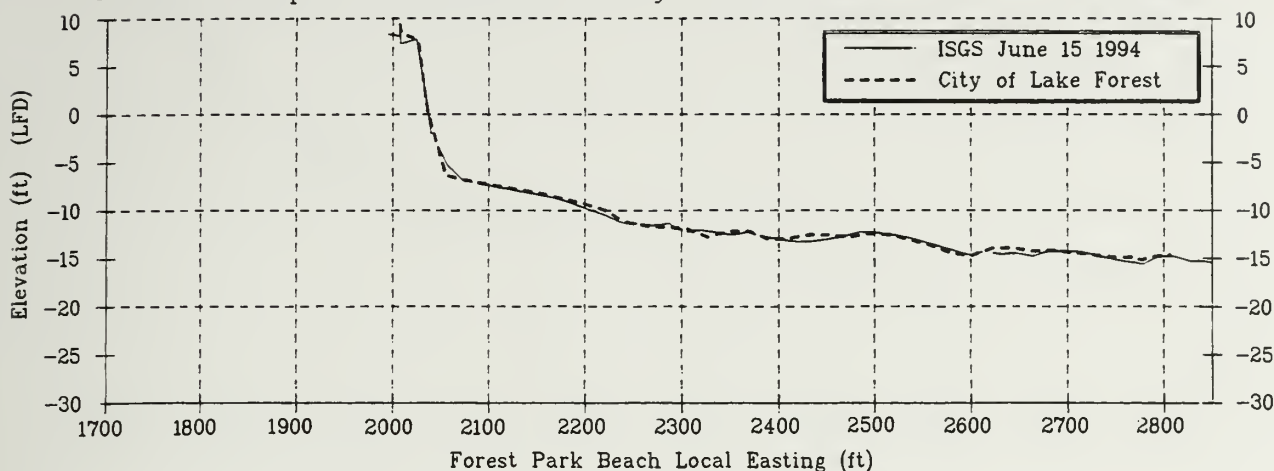


N 6217 Comparison of ISGS and City of Lake Forest 1994 Short Profiles

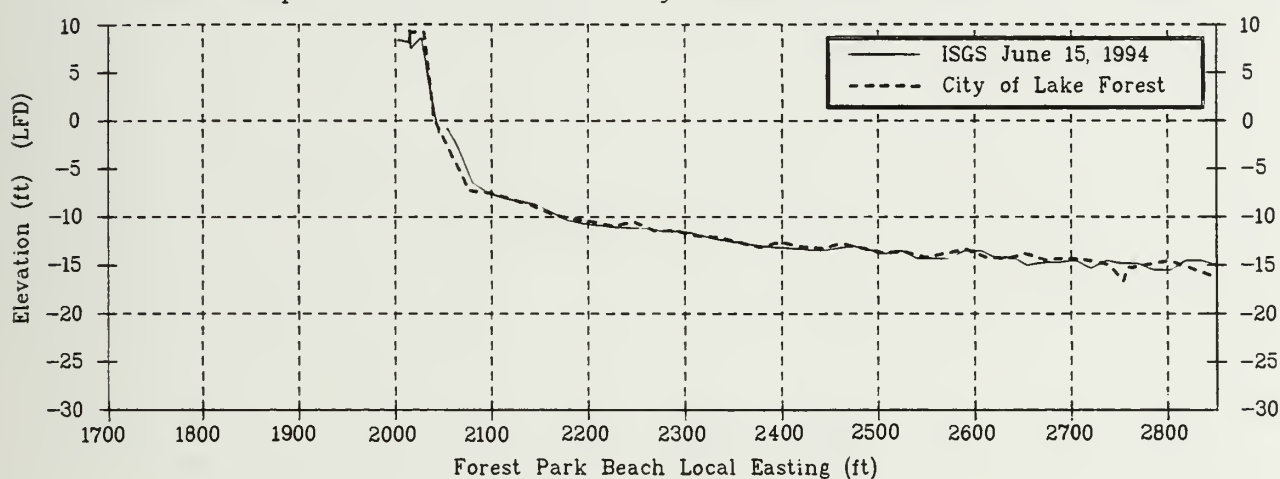




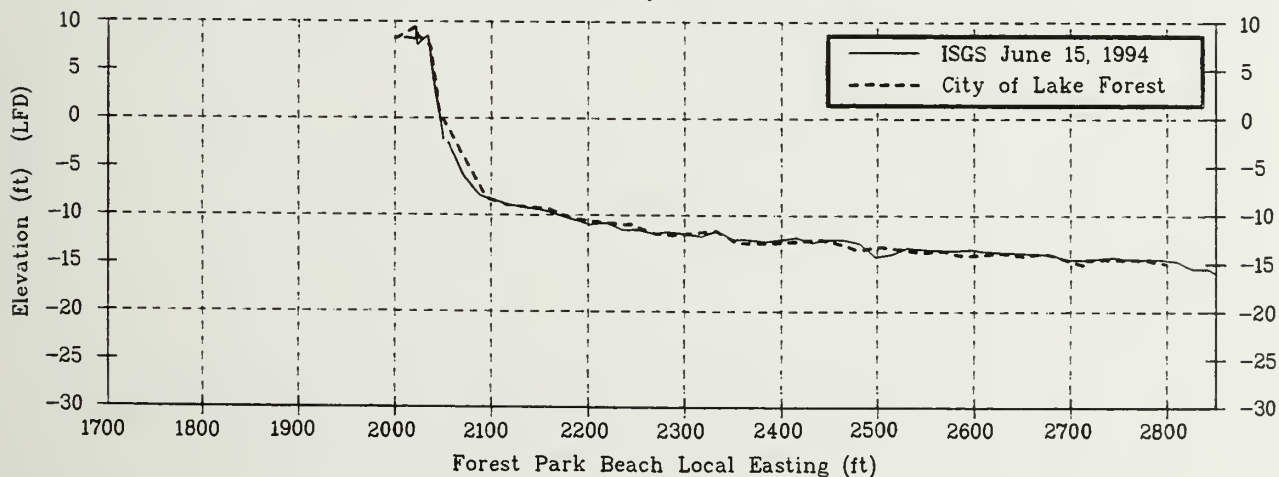
N 6017 Comparison of ISGS and City of Lake Forest 1994 Short Profiles



N 5817 Comparisons of ISGS and City of Lake Forest 1994 Short Profiles



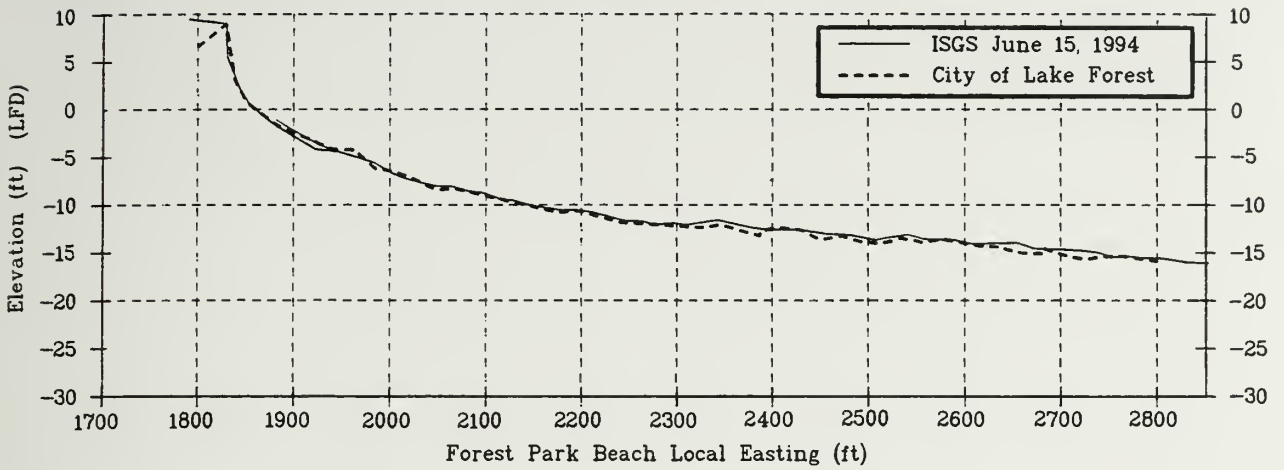
N 5617 Comparison of ISGS and City of Lake Forest 1994 Short Profiles



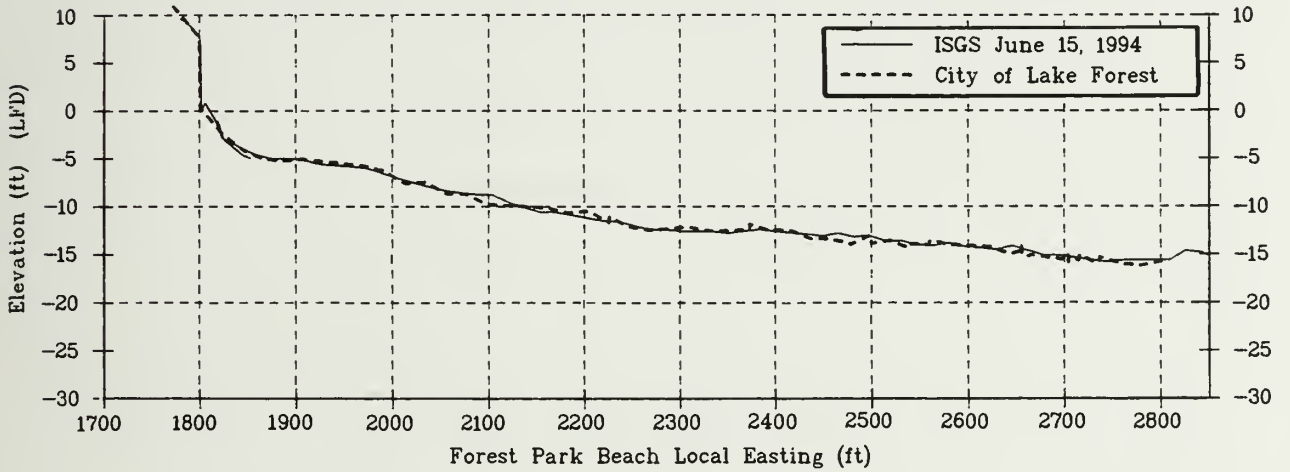




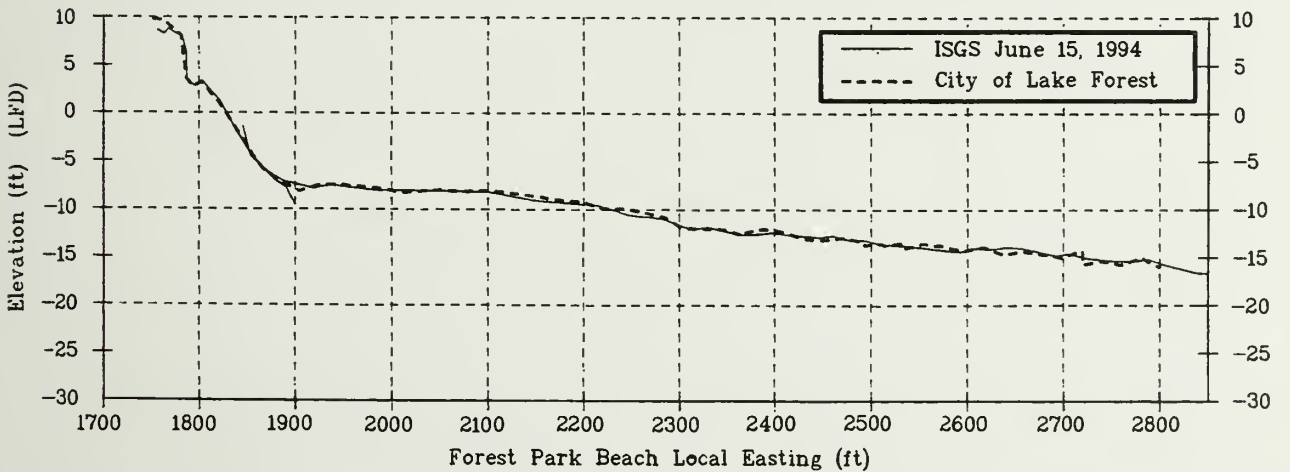
N 5417 Comparison of ISGS and City of Lake Forest 1994 Short Profiles



N 5267 Comparison of ISGS and City of Lake Forest 1994 Short Profiles

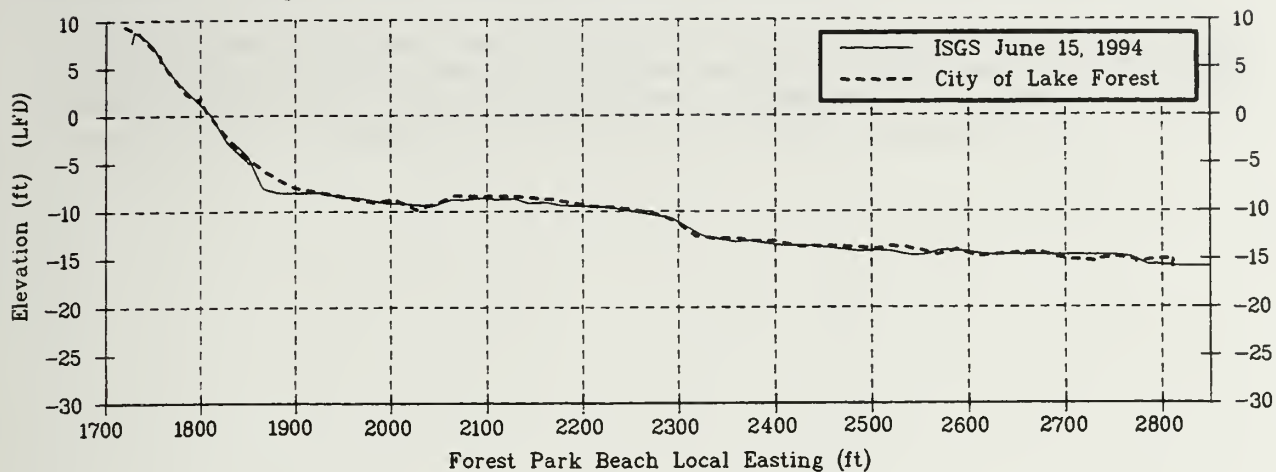


N 5067 Comparison of ISGS and City of Lake Forest 1994 Short Profiles

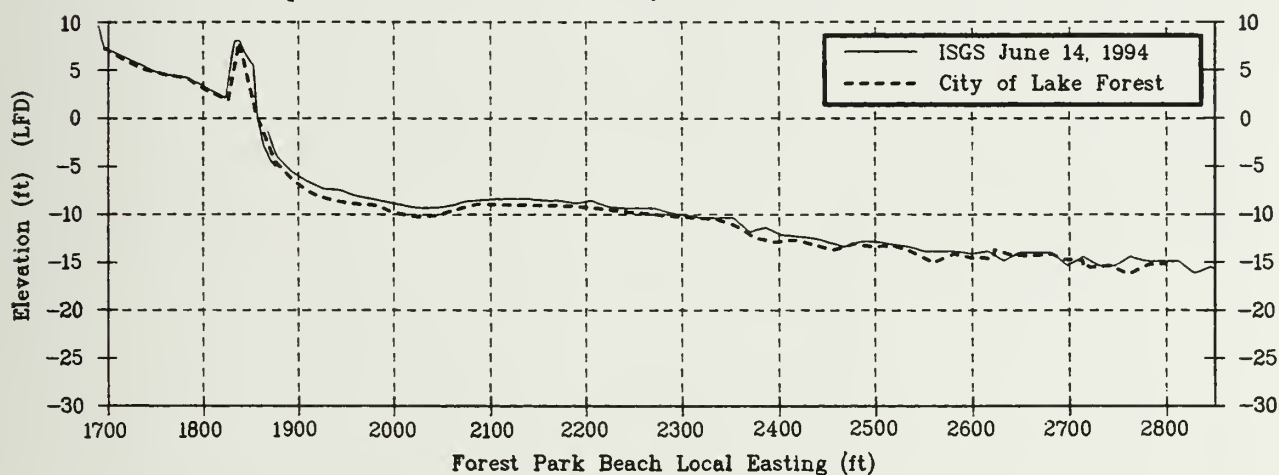




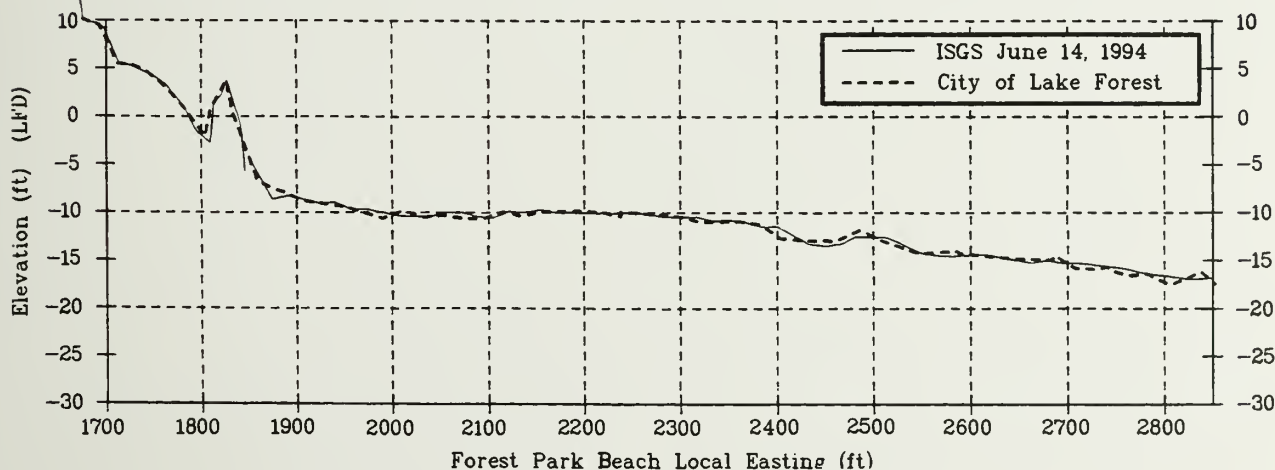
N 4867 Comparison of ISGS and City of Lakeforest 1994 Short Profiles



N 4667 Comparison of ISGS and City of Lake Forest 1994 Short Profiles



N 4467 Comparison of ISGS and City of Lake Forest 1994 Short Profiles





**APPENDIX D   CALCULATIONS OF ACCRETION AND EROSION AT FOREST PARK BEACH**

The tables included in this appendix contain the individual calculations of volume of accretion and erosion by intervals from the lake-bottom change maps created using the TIN method. Data are compiled in half-foot increments from 0.0 to 3.0 ft. For example, when the threshold is 1.0 ft, volumes given represent accretion and erosion of greater than 1.0 ft. Volumes are rounded to the nearest 100 ft.





**Table D1** Accretion and erosion at Forest Park Beach in the updrift zone, determined from lake-bottom change maps.

Interval	Threshold (ft)	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987 to 1993	0.0	20,400	18,100	+2,300
	0.5	9,200	5,700	+3,500
	1.0	4,200	1,600	+2,600
	1.5	1,800	300	+1,500
	2.0	900	0	+900
	2.5	400	0	+400
	3.0	100	0	+100
1993 to 1994	0.0	9,600	800	+8,800
	0.5	1,600	100	+1,500
	1.0	300	0	+300
	1.5	0	0	0
	2.0	0	0	0
	2.5	0	0	0
	3.0	0	0	0
1987 to 1993	0.0	30,000	18,900	+11,100
	0.5	10,800	5,800	+5,000
	1.0	4,500	1,600	+2,900
	1.5	1,800	300	+1,500
	2.0	900	0	+900
	2.5	400	0	+400
	3.0	100	0	+100



**Table D2** Accretion and erosion at Forest Park Beach in the beach cells, determined from lake-bottom change maps.

Interval	Threshold (ft)	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987 to 1993	0.0	35,000	22,400	+12,600
	0.5	23,100	11,200	+11,900
	1.0	15,300	6,000	+9,300
	1.5	10,000	3,200	+6,800
	2.0	6,100	2,000	+4,100
	2.5	3,500	1,100	+2,400
	3.0	1,900	500	+1,400
1993 to 1994	0.0	6,100	1,500	+4,600
	0.5	2,400	200	+2,200
	1.0	1,500	0	+1,500
	1.5	1,000	0	+1,000
	2.0	700	0	+700
	2.5	400	0	+400
	3.0	200	0	+200
1987 to 1994	0.0	41,100	23,900	+17,200
	0.5	25,500	11,400	+14,100
	1.0	16,800	6,000	+10,800
	1.5	11,000	3,200	+7,800
	2.0	6,800	2,000	+4,800
	2.5	3,900	1,100	+2,800
	3.0	2,100	500	+1,600



**Table D3** Accretion and erosion at Forest Park Beach in the lakeward perimeter, determined from lake-bottom change maps.

Interval	Threshold (ft)	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987 to 1993	0.0	72,000	12,000	+60,000
	0.5	46,400	2,600	+43,800
	1.0	31,800	900	+30,900
	1.5	21,200	500	+20,700
	2.0	13,200	200	+13,000
	2.5	7,800	100	+7,700
	3.0	4,800	0	+4,800
1993 to 1994	0.0	11,200	1,600	+9,600
	0.5	3,600	500	+3,100
	1.0	1,200	200	+1,000
	1.5	400	100	+300
	2.0	200	0	+200
	2.5	0	0	0
	3.0	0	0	0
1987 to 1994	0.0	83,200	13,600	+69,600
	0.5	50,000	3,100	+46,900
	1.0	33,000	1,100	+31,900
	1.5	21,600	600	+21,000
	2.0	13,400	200	+13,200
	2.5	7,800	100	+7,700
	3.0	4,800	0	+4,800





**Table D4** Accretion and erosion at Forest Park Beach in the southern lakeward perimeter, determined from lake-bottom change maps.

Interval	Threshold (ft)	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987 to 1993	0.0	10,400	18,500	-8,100
	0.5	5,200	7,900	-2,700
	1.0	2,300	4,000	-1,700
	1.5	1,000	2,100	-1,100
	2.0	500	1,000	-500
	2.5	200	300	-100
	3.0	100	0	+100
1993 to 1994	0.0	7,000	600	+6,400
	0.5	500	200	+300
	1.0	100	100	0
	1.5	0	0	0
	2.0	0	0	0
	2.5	0	0	0
	3.0	0	0	0
1987 to 1994	0.0	17,400	19,100	-1,700
	0.5	5,700	8,100	-2,400
	1.0	2,400	4,100	-1,700
	1.5	1,000	2,100	-1,100
	2.0	500	1,000	-500
	2.5	200	300	-100
	3.0	100	0	+100



**Table D5** Accretion and erosion at Forest Park Beach in the downdrift zone, determined from lake-bottom change maps.

Interval	Threshold (ft)	Accretion (cu yd)	Erosion (cu yd)	Net change (cu yd)
1987 to 1993	0.0	13,600	32,800	-19,200
	0.5	2,500	19,600	-17,100
	1.0	400	11,600	-11,200
	1.5	100	5,100	-5,000
	2.0	0	2,300	-2,300
	2.5	0	700	-700
	3.0	0	300	-300
1993 to 1994	0.0	10,400	600	+9,800
	0.5	1,600	0	+1,600
	1.0	500	0	+500
	1.5	0	0	0
	2.0	0	0	0
	2.5	0	0	0
	3.0	0	0	0
1987 to 1994	0.0	24,000	33,400	-9,400
	0.5	4,100	19,600	-15,500
	1.0	900	11,600	-10,700
	1.5	100	5,100	-5,000
	2.0	0	2,300	-2,300
	2.5	0	700	-700
	3.0	0	300	-300



## **APPENDIX E    TABULAR DATA FOR ISGS 1994 PRISM-POLE SURVEYS AND FATHOMETER SURVEYS**

All data are referenced to Lake Forest Datum (LFD). These data extend offshore either to the first occurrence of depth at 17.94 ft LFD (-20 ft Low Water Datum) or a distance of 550 m (1,800 ft) from the onshore Mini-Ranger station, whichever is greater.





1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N9430

June 16, 1994

Start/End Time: 1708/1715 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 1818.022

Low Water Datum [LWD] Correction feet -2.56

MR Dist.	Northing (ft)	Easting (ft)	Elev. (ft)	Depth (ft)
(m)	[IL SPC]	[IL SPC]	[LFD]	[LWD]

Prism Pole Data

2037090.582	638121.079	6.188	8.248
2037092.172	638126.491	5.185	7.245
2037097.516	638138.141	3.488	5.548
2037102.385	638152.577	3.212	5.272
2037105.963	638163.410	2.593	4.653
2037110.722	638174.318	0.224	2.284
2037113.028	638179.209	-0.317	1.743
2037112.876	638179.589	3.875	5.935
2037112.165	638180.106	-3.220	-1.160
2037120.075	638190.141	-3.279	-1.219
2037122.156	638204.486	-3.518	-1.458
2037128.450	638217.772	-3.635	-1.575
2037131.675	638227.700	-3.721	-1.661
2037136.852	638236.479	-4.385	-2.325

Fathometer Data

17	2037112	638178	-3.5	-1.4
20	2037116	638187	-3.5	-1.4
25	2037121	638203	-4.0	-1.9
30	2037127	638218	-4.1	-2.0
35	2037133	638233	-4.7	-2.6
40	2037139	638249	-5.5	-3.4
45	2037145	638264	-6.5	-4.4
50	2037150	638279	-7.1	-5.0
55	2037156	638295	-7.5	-5.4
60	2037162	638310	-8.0	-5.9
65	2037168	638325	-8.5	-6.4
70	2037174	638341	-8.5	-6.4
75	2037180	638356	-8.5	-6.4
80	2037185	638371	-8.5	-6.4
85	2037191	638387	-8.5	-6.4
90	2037197	638402	-9.0	-6.9
95	2037203	638417	-9.0	-6.9
100	2037209	638433	-9.0	-6.9
105	2037214	638448	-9.0	-6.9
110	2037220	638463	-9.0	-6.9
115	2037226	638479	-9.0	-6.9
120	2037232	638494	-9.0	-6.9
125	2037238	638509	-9.5	-7.4
130	2037244	638525	-9.5	-7.4
135	2037249	638540	-9.5	-7.4
140	2037255	638556	-10.0	-7.9
145	2037261	638571	-10.0	-7.9
150	2037267	638586	-10.3	-8.2
155	2037273	638602	-10.7	-8.6
160	2037279	638617	-10.8	-8.7
165	2037284	638632	-11.5	-9.4
170	2037290	638648	-11.5	-9.4
175	2037296	638663	-12.0	-9.9
180	2037302	638678	-11.7	-9.6
185	2037308	638694	-12.5	-10.4
190	2037313	638709	-12.0	-9.9
195	2037319	638724	-12.5	-10.4
200	2037325	638740	-13.3	-11.2
205	2037331	638755	-14.0	-11.9
210	2037337	638770	-13.8	-11.7
215	2037343	638786	-13.5	-11.4
220	2037348	638801	-14.0	-11.9
225	2037354	638816	-14.5	-12.4
230	2037360	638832	-13.5	-11.4
235	2037366	638847	-13.5	-11.4
240	2037372	638862	-13.0	-10.9

MR Dist.	Northing (ft)	Easting (ft)	Elev. (ft)	Depth (ft)
(m)	[IL SPC]	[IL SPC]	[LFD]	[LWD]
245	2037377	638878	-13.0	-10.9
250	2037383	638893	-13.0	-10.9
255	2037389	638908	-13.3	-11.2
260	2037395	638924	-13.0	-10.9
265	2037401	638939	-13.5	-11.4
270	2037407	638954	-13.5	-11.4
275	2037412	638970	-13.5	-11.4
280	2037418	638985	-13.9	-11.8
285	2037424	639000	-14.0	-11.9
290	2037430	639016	-14.0	-11.9
295	2037436	639031	-14.5	-12.4
300	2037441	639046	-14.5	-12.4
305	2037447	639062	-14.7	-12.6
310	2037453	639077	-15.0	-12.9
315	2037459	639092	-15.5	-13.4
320	2037465	639108	-16.5	-14.4
325	2037471	639123	-17.0	-14.9
330	2037476	639138	-17.5	-15.4
335	2037482	639154	-17.5	-15.4
340	2037488	639169	-18.0	-15.9
345	2037494	639184	-18.0	-15.9
350	2037500	639200	-17.9	-15.8
355	2037505	639215	-18.5	-16.4
360	2037511	639230	-18.7	-16.6
365	2037517	639246	-18.7	-16.6
370	2037523	639261	-18.7	-16.6
375	2037529	639276	-18.5	-16.4
380	2037535	639292	-18.5	-16.4
385	2037540	639307	-18.5	-16.4
390	2037546	639322	-18.9	-16.8
395	2037552	639338	-18.5	-16.4
400	2037558	639353	-18.7	-16.6
405	2037564	639368	-19.3	-17.2
410	2037569	639384	-19.7	-17.6
415	2037575	639399	-20.5	-18.4
420	2037581	639414	-20.5	-18.4
425	2037587	639430	-20.5	-18.4
430	2037593	639445	-20.5	-18.4
435	2037599	639460	-19.5	-17.4
440	2037604	639476	-21.5	-19.4
445	2037610	639491	-21.5	-19.4
450	2037616	639506	-21.5	-19.4
455	2037622	639522	-21.5	-19.4
460	2037628	639537	-21.5	-19.4
465	2037633	639552	-21.9	-19.8
470	2037639	639568	-21.5	-19.4
475	2037645	639583	-23.0	-20.9



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N9230

June 16, 1994

Start/End Time 1724/1732 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 1847.810

Low Water Datum [LWD] Correction feet -2.55

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2036906.940	638201.269	7.866	9.9265
2036909.584	638208.177	5.856	7.9165
2036913.608	638219.110	3.894	5.9545
2036917.131	638228.186	1.787	3.8475
2036919.383	638237.709	0.334	2.3945
2036930.799	638258.735	-2.007	0.0535
2036938.398	638270.804	-2.504	-0.4435
2036937.474	638284.181	-2.515	-0.4545
2036941.518	638295.855	-3.049	-0.9885
2036945.458	638307.391	-3.836	-1.7755
2036950.513	638319.022	-4.432	-2.3715

Fathometer Data

10	2036928	638256	-2.5	-0.4
15	2036933	638271	-3.0	-0.9
20	2036939	638286	-3.5	-1.4
25	2036945	638302	-4.3	-2.2
30	2036951	638317	-5.0	-2.9
35	2036957	638332	-5.5	-3.4
40	2036962	638348	-5.8	-3.7
45	2036968	638363	-6.5	-4.4
50	2036974	638378	-7.0	-4.9
55	2036980	638394	-7.5	-5.4
60	2036986	638409	-7.5	-5.4
65	2036992	638424	-7.7	-5.6
70	2036997	638440	-7.8	-5.7
75	2037003	638455	-7.7	-5.6
80	2037009	638470	-8.5	-6.4
85	2037015	638486	-8.5	-6.4
90	2037021	638501	-8.5	-6.4
95	2037026	638516	-8.5	-6.4
100	2037032	638532	-8.5	-6.4
105	2037038	638547	-8.5	-6.4
110	2037044	638562	-8.5	-6.4
115	2037050	638578	-8.7	-6.6
120	2037056	638593	-8.5	-6.4
125	2037061	638608	-8.7	-6.6
130	2037067	638624	-9.0	-6.9
135	2037073	638639	-9.0	-6.9
140	2037079	638654	-9.5	-7.4
145	2037085	638670	-9.5	-7.4
150	2037090	638685	-9.5	-7.4
155	2037096	638700	-10.5	-8.4
160	2037102	638716	-10.5	-8.4
165	2037108	638731	-11.0	-8.9
170	2037114	638746	-11.5	-9.4
175	2037120	638762	-12.5	-10.4
180	2037125	638777	-12.3	-10.2
185	2037131	638792	-12.5	-10.4
190	2037137	638808	-13.0	-10.9
195	2037143	638823	-12.8	-10.7
200	2037149	638838	-14.0	-11.9
205	2037154	638854	-13.5	-11.4
210	2037160	638869	-13.5	-11.4
215	2037166	638884	-14.0	-11.9
220	2037172	638900	-14.0	-11.9
225	2037178	638915	-14.7	-12.6
230	2037184	638930	-14.7	-12.6
235	2037189	638946	-14.5	-12.4
240	2037195	638961	-14.7	-12.6
245	2037201	638976	-15.5	-13.4
250	2037207	638992	-15.5	-13.4

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
255	2037213	639007	-15.8	-13.7
260	2037218	639022	-15.8	-13.7
265	2037224	639038	-16.0	-13.9
270	2037230	639053	-16.5	-14.4
275	2037236	639068	-16.8	-14.7
280	2037242	639084	-17.3	-15.2
285	2037248	639099	-17.0	-14.9
290	2037253	639114	-17.5	-15.4
295	2037259	639130	-17.5	-15.4
300	2037265	639145	-17.8	-15.7
305	2037271	639160	-17.5	-15.4
310	2037277	639176	-17.5	-15.4
315	2037282	639191	-17.5	-15.4
320	2037288	639206	-18.0	-15.9
325	2037294	639222	-18.3	-16.2
330	2037300	639237	-18.5	-16.4
335	2037306	639252	-18.0	-15.9
340	2037312	639268	-18.0	-15.9
345	2037317	639283	-18.5	-16.4
350	2037323	639298	-18.5	-16.4
355	2037329	639314	-18.0	-15.9
360	2037335	639329	-18.5	-16.4
365	2037341	639344	-19.0	-16.9
370	2037346	639360	-19.5	-17.4
375	2037352	639375	-18.5	-16.4
380	2037358	639391	-18.5	-16.4
385	2037364	639406	-19.0	-16.9
390	2037370	639421	-19.8	-17.7
395	2037376	639437	-20.5	-18.4
400	2037381	639452	-21.0	-18.9
405	2037387	639467	-21.0	-18.9
410	2037393	639483	-21.3	-19.2
415	2037399	639498	-20.5	-18.4
420	2037405	639513	-20.8	-18.7
425	2037411	639529	-21.5	-19.4
430	2037416	639544	-21.5	-19.4
435	2037422	639559	-21.5	-19.4
440	2037428	639575	-21.0	-18.9
445	2037434	639590	-21.5	-19.4
450	2037440	639605	-21.0	-18.9
455	2037445	639621	-21.0	-18.9
460	2037451	639636	-21.5	-19.4
465	2037457	639651	-22.3	-20.2



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N9030

June 16, 1994

Start/End Time: 1740/1748 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 1896.703

Low Water Datum [LWD] Correction feet -2.54

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2036734.052	638310.045	9.695	11.7555
2036735.977	638315.133	7.434	9.4945
2036738.214	638319.886	4.349	6.4095
2036740.800	638326.870	2.811	4.8715
2036744.240	638336.093	1.450	3.5105
2036747.092	638344.694	0.357	2.4175
2036750.392	638357.453	-0.686	1.3745
2036754.886	638371.165	-2.134	-0.0735
2036759.404	638382.037	-3.049	-0.9885
2036760.321	638385.901	-3.156	-1.0955
2036764.383	638394.555	-2.631	-0.5705
2036767.670	638404.637	-2.553	-0.4925
2036771.891	638413.937	-3.146	-1.0855
2036776.707	638424.067	-3.755	-1.6945
2036781.787	638436.058	-4.257	-2.1965
2036786.618	638449.305	-4.809	-2.7485

Fathometer Data

7	2036754	638363	-1.7	0.3
10	2036758	638372	-3.5	-1.5
15	2036764	638388	-3.5	-1.5
20	2036769	638403	-3.0	-1.0
25	2036775	638418	-4.3	-2.3
30	2036781	638434	-5.0	-3.0
35	2036787	638449	-5.5	-3.5
40	2036793	638464	-6.3	-4.3
45	2036799	638480	-6.5	-4.5
50	2036804	638495	-6.7	-4.7
55	2036810	638510	-7.5	-5.5
60	2036816	638526	-7.5	-5.5
65	2036822	638541	-7.7	-5.7
70	2036828	638556	-7.8	-5.8
75	2036834	638572	-8.0	-6.0
80	2036839	638587	-8.0	-6.0
85	2036845	638602	-8.1	-6.1
90	2036851	638618	-8.5	-6.5
95	2036857	638633	-8.5	-6.5
100	2036863	638648	-8.5	-6.5
105	2036868	638664	-8.5	-6.5
110	2036874	638679	-8.5	-6.5
115	2036880	638694	-8.5	-6.5
120	2036886	638710	-9.0	-7.0
125	2036892	638725	-9.3	-7.3
130	2036898	638740	-9.5	-7.5
135	2036903	638756	-10.5	-8.5
140	2036909	638771	-10.5	-8.5
145	2036915	638786	-11.5	-9.5
150	2036921	638802	-12.0	-10.0
155	2036927	638817	-12.5	-10.5
160	2036932	638832	-12.6	-10.6
165	2036938	638848	-13.0	-11.0
170	2036944	638863	-13.5	-11.5
175	2036950	638878	-13.0	-11.0
180	2036956	638894	-13.0	-11.0
185	2036962	638909	-12.3	-10.3
190	2036967	638924	-12.5	-10.5
195	2036973	638940	-12.9	-10.9
200	2036979	638955	-13.5	-11.5
205	2036985	638970	-14.3	-12.3
210	2036991	638986	-14.0	-12.0
215	2036996	639001	-14.5	-12.5
220	2037002	639016	-14.5	-12.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
225	2037008	639032	-15.5	-13.5
230	2037014	639047	-16.0	-14.0
235	2037020	639062	-17.0	-15.0
240	2037026	639078	-16.5	-14.5
245	2037031	639093	-16.5	-14.5
250	2037037	639108	-16.5	-14.5
255	2037043	639124	-17.5	-15.5
260	2037049	639139	-17.5	-15.5
265	2037055	639154	-17.0	-15.0
270	2037060	639170	-16.9	-14.9
275	2037066	639185	-17.1	-15.1
280	2037072	639200	-17.5	-15.5
285	2037078	639216	-18.0	-16.0
290	2037084	639231	-17.5	-15.5
295	2037090	639246	-18.0	-16.0
300	2037095	639262	-18.5	-16.5
305	2037101	639277	-18.0	-16.0
310	2037107	639292	-18.5	-16.5
315	2037113	639308	-19.0	-17.0
320	2037119	639323	-19.5	-17.5
325	2037124	639338	-19.5	-17.5
330	2037130	639354	-19.5	-17.5
335	2037136	639369	-18.0	-16.0
340	2037142	639384	-19.0	-17.0
345	2037148	639400	-19.5	-17.5
350	2037154	639415	-19.5	-17.5
355	2037159	639430	-20.7	-18.7
360	2037165	639446	-20.7	-18.7
365	2037171	639461	-20.0	-18.0
370	2037177	639476	-21.5	-19.5
375	2037183	639492	-21.0	-19.0
380	2037188	639507	-21.5	-19.5
385	2037194	639523	-21.5	-19.5
390	2037200	639538	-20.5	-18.5
395	2037206	639553	-20.5	-18.5
400	2037212	639569	-21.0	-19.0
405	2037218	639584	-21.2	-19.2
410	2037223	639599	-21.0	-19.0
415	2037229	639615	-21.5	-19.5
420	2037235	639630	-21.5	-19.5
425	2037241	639645	-21.5	-19.5
430	2037247	639661	-21.5	-19.5
435	2037252	639676	-21.0	-19.0
440	2037258	639691	-20.5	-18.5
445	2037264	639707	-20.0	-18.0
450	2037270	639722	-20.0	-18.0
455	2037276	639737	-20.5	-18.5
460	2037282	639753	-21.0	-19.0
465	2037287	639768	-21.0	-19.0
470	2037293	639783	-21.5	-19.5
475	2037299	639799	-21.5	-19.5
480	2037305	639814	-21.5	-19.5
485	2037311	639829	-22.5	-20.5





1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N8830

June 16, 1994

Start/End Time: 1756/1805 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 1923.994

Low Water Datum [LWD] Correction feet -2.53

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2036548.417	638383.925	5.764	7.8245
2036550.960	638391.090	5.141	7.2015
2036555.850	638403.460	4.467	6.5275
2036562.657	638420.630	3.274	5.3345
2036568.215	638435.225	2.404	4.4645
2036571.145	638443.375	1.376	3.4365
2036573.518	638448.948	1.177	3.2375
2036574.820	638452.042	0.461	2.5215
2036580.374	638469.183	-2.080	-0.0195
2036584.561	638480.961	-3.166	-1.1055
2036587.371	638488.487	-3.547	-1.4865
2036591.730	638501.052	-2.563	-0.5025
2036597.354	638511.593	-2.373	-0.3125
2036602.075	638523.255	-2.895	-0.8345
2036607.405	638535.162	-3.583	-1.5225
2036611.150	638546.951	-4.038	-1.9775
2036616.848	638557.174	-4.490	-2.4295

Fathometer Data

10	2036581	638469	-2.7	-0.7
15	2036586	638484	-3.8	-1.8
20	2036592	638499	-2.5	-0.5
25	2036598	638515	-3.0	-1.0
30	2036604	638530	-3.8	-1.8
35	2036610	638545	-4.5	-2.5
40	2036615	638561	-5.5	-3.5
45	2036621	638576	-5.5	-3.5
50	2036627	638591	-6.1	-4.1
55	2036633	638607	-6.5	-4.5
60	2036639	638622	-6.7	-4.7
65	2036645	638637	-7.5	-5.5
70	2036650	638653	-7.5	-5.5
75	2036656	638668	-7.5	-5.5
80	2036662	638683	-7.7	-5.7
85	2036668	638699	-8.0	-6.0
90	2036674	638714	-8.0	-6.0
95	2036679	638729	-8.1	-6.1
100	2036685	638745	-8.3	-6.3
105	2036691	638760	-8.5	-6.5
110	2036697	638775	-8.5	-6.5
115	2036703	638791	-9.3	-7.3
120	2036709	638806	-9.5	-7.5
125	2036714	638821	-9.7	-7.7
130	2036720	638837	-10.0	-8.0
135	2036726	638852	-10.5	-8.5
140	2036732	638867	-10.5	-8.5
145	2036738	638883	-11.0	-9.0
150	2036743	638898	-11.5	-9.5
155	2036749	638913	-12.3	-10.3
160	2036755	638929	-11.7	-9.7
165	2036761	638944	-11.7	-9.7
170	2036767	638959	-11.7	-9.7
175	2036773	638975	-12.0	-10.0
180	2036778	638990	-13.0	-11.0
185	2036784	639005	-13.9	-11.9
190	2036790	639021	-14.0	-12.0
195	2036796	639036	-14.5	-12.5
200	2036802	639051	-15.5	-13.5
205	2036807	639067	-15.5	-13.5
210	2036813	639082	-15.5	-13.5
215	2036819	639097	-16.0	-14.0
220	2036825	639113	-16.5	-14.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
225	2036831	639128	-15.5	-13.5
230	2036837	639144	-16.7	-14.7
235	2036842	639159	-17.5	-15.5
240	2036848	639174	-17.5	-15.5
245	2036854	639190	-17.5	-15.5
250	2036860	639205	-17.0	-15.0
255	2036866	639220	-16.5	-14.5
260	2036872	639236	-16.8	-14.8
265	2036877	639251	-16.5	-14.5
270	2036883	639266	-16.5	-14.5
275	2036889	639282	-17.5	-15.5
280	2036895	639297	-16.9	-14.9
285	2036901	639312	-16.5	-14.5
290	2036906	639328	-17.5	-15.5
295	2036912	639343	-18.5	-16.5
300	2036918	639358	-18.5	-16.5
305	2036924	639374	-19.5	-17.5
310	2036930	639389	-19.5	-17.5
315	2036936	639404	-17.5	-15.5
320	2036941	639420	-18.5	-16.5
325	2036947	639435	-18.5	-16.5
330	2036953	639450	-19.0	-17.0
335	2036959	639466	-19.8	-17.8
340	2036965	639481	-20.5	-18.5
345	2036970	639496	-20.5	-18.5
350	2036976	639512	-19.9	-17.9
355	2036982	639527	-21.0	-19.0
360	2036988	639542	-21.5	-19.5
365	2036994	639558	-21.5	-19.5
370	2037000	639573	-21.5	-19.5
375	2037005	639588	-21.0	-19.0
380	2037011	639604	-20.5	-18.5
385	2037017	639619	-19.5	-17.5
390	2037023	639634	-19.5	-17.5
395	2037029	639650	-20.0	-18.0
400	2037034	639665	-21.0	-19.0
405	2037040	639680	-21.5	-19.5
410	2037046	639696	-21.5	-19.5
415	2037052	639711	-22.3	-20.3



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N8630

June 16, 1994

Start/End Time: 1810/1818 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 1962.678

Low Water Datum [LWD] Correction feet -2.53

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
2036375.327	638490.486	3.573	5.6335	
2036381.397	638506.675	3.303	5.3635	
2036389.779	638526.633	3.175	5.2355	
2036394.224	638540.964	2.492	4.5525	
2036396.103	638546.254	2.734	4.7945	
2036398.863	638556.362	1.400	3.4605	
2036400.903	638560.431	1.615	3.6755	
2036402.849	638565.802	0.480	2.5405	
2036411.888	638586.057	-4.077	-2.0165	
2036414.926	638590.064	-4.286	-2.2255	
2036417.263	638603.674	-3.563	-1.5025	
2036421.999	638615.138	-2.714	-0.6535	
2036425.977	638626.288	-2.588	-0.5275	
2036430.773	638640.337	-3.307	-1.2465	
2036434.565	638652.774	-4.035	-1.9745	
2036438.233	638663.659	-4.606	-2.5455	

Fathometer Data

10	2036407	638576	-2.0	0.0
15	2036413	638591	-4.5	-2.5
20	2036419	638606	-3.5	-1.5
25	2036425	638622	-2.5	-0.5
30	2036431	638637	-3.5	-1.5
35	2036436	638652	-4.1	-2.1
40	2036442	638668	-4.7	-2.7
45	2036448	638683	-5.7	-3.7
50	2036454	638698	-6.5	-4.5
55	2036460	638714	-6.7	-4.7
60	2036465	638729	-7.0	-5.0
65	2036471	638744	-7.5	-5.5
70	2036477	638760	-7.5	-5.5
75	2036483	638775	-7.7	-5.7
80	2036489	638791	-8.0	-6.0
85	2036495	638806	-8.0	-6.0
90	2036500	638821	-8.3	-6.3
95	2036506	638837	-8.5	-6.5
100	2036512	638852	-8.5	-6.5
105	2036518	638867	-9.0	-7.0
110	2036524	638883	-9.3	-7.3
115	2036529	638898	-9.5	-7.5
120	2036535	638913	-9.5	-7.5
125	2036541	638929	-9.5	-7.5
130	2036547	638944	-10.5	-8.5
135	2036553	638959	-10.9	-8.9
140	2036559	638975	-11.5	-9.5
145	2036564	638990	-11.5	-9.5
150	2036570	639005	-11.5	-9.5
155	2036576	639021	-11.7	-9.7
160	2036582	639036	-12.1	-10.1
165	2036588	639051	-13.5	-11.5
170	2036593	639067	-14.5	-12.5
175	2036599	639082	-14.5	-12.5
180	2036605	639097	-14.7	-12.7
185	2036611	639113	-15.0	-13.0
190	2036617	639128	-14.7	-12.7
195	2036623	639143	-15.5	-13.5
200	2036628	639159	-15.5	-13.5
205	2036634	639174	-14.5	-12.5
210	2036640	639189	-15.3	-13.3
215	2036646	639205	-15.5	-13.5
220	2036652	639220	-16.3	-14.3
225	2036658	639235	-15.5	-13.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
230	2036663	639251	-15.5	-13.5
235	2036669	639266	-15.5	-13.5
240	2036675	639281	-17.5	-15.5
245	2036681	639297	-17.5	-15.5
250	2036687	639312	-16.0	-14.0
255	2036692	639327	-17.5	-15.5
260	2036698	639343	-17.5	-15.5
265	2036704	639358	-17.5	-15.5
270	2036710	639373	-18.5	-16.5
275	2036716	639389	-18.5	-16.5
280	2036722	639404	-18.7	-16.7
285	2036727	639419	-19.5	-17.5
290	2036733	639435	-19.0	-17.0
295	2036739	639450	-18.9	-16.9
300	2036745	639465	-18.9	-16.9
305	2036751	639481	-18.5	-16.5
310	2036756	639496	-19.5	-17.5
315	2036762	639511	-19.5	-17.5
320	2036768	639527	-19.0	-17.0
325	2036774	639542	-19.5	-17.5
330	2036780	639557	-19.5	-17.5
335	2036786	639573	-19.5	-17.5
340	2036791	639588	-20.5	-18.5
345	2036797	639603	-20.5	-18.5
350	2036803	639619	-20.9	-18.9
355	2036809	639634	-21.5	-19.5
360	2036815	639649	-21.0	-19.0
365	2036820	639665	-21.0	-19.0
370	2036826	639680	-21.0	-19.0
375	2036832	639695	-22.5	-20.5



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N8430

June 16, 1994

Start/End Time: 1342/1350 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2058.369

Low Water Datum [LWD] Correction feet -2.53

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
2036193.123	638573.078	7.526	9.5865	
2036195.150	638580.070	5.664	7.7245	
2036202.569	638599.620	4.437	6.4975	
2036210.443	638622.415	2.752	4.8125	
2036221.071	638649.690	2.025	4.0855	
2036228.638	638670.174	1.439	3.4995	
2036232.174	638679.407	0.686	2.7465	
2036235.002	638686.473	-0.266	1.7945	
2036235.677	638690.291	3.064	5.1245	
2036238.644	638696.249	6.677	8.7375	
2036246.103	638715.533	4.601	6.6615	
2036248.384	638721.777	3.759	5.8195	
2036249.230	638722.680	0.920	2.9805	

Fathometer Data

10	2036254	638736	-4.5	-2.5
15	2036260	638752	-5.8	-3.8
20	2036266	638767	-5.2	-3.2
25	2036272	638782	-4.5	-2.5
30	2036278	638798	-5.0	-3.0
35	2036283	638813	-5.5	-3.5
40	2036289	638828	-6.0	-4.0
45	2036295	638844	-7.3	-5.3
50	2036301	638859	-7.7	-5.7
55	2036307	638874	-8.5	-6.5
60	2036312	638890	-8.5	-6.5
65	2036318	638905	-8.7	-6.7
70	2036324	638920	-9.0	-7.0
75	2036330	638936	-9.5	-7.5
80	2036336	638951	-9.5	-7.5
85	2036342	638966	-9.8	-7.8
90	2036347	638982	-10.5	-8.5
95	2036353	638997	-10.5	-8.5
100	2036359	639012	-10.5	-8.5
105	2036365	639028	-10.7	-8.7
110	2036371	639043	-10.8	-8.8
115	2036376	639058	-11.5	-9.5
120	2036382	639074	-11.5	-9.5
125	2036388	639089	-12.5	-10.5
130	2036394	639104	-13.0	-11.0
135	2036400	639120	-12.5	-10.5
140	2036406	639135	-12.5	-10.5
145	2036411	639150	-12.9	-10.9
150	2036417	639166	-13.0	-11.0
155	2036423	639181	-13.0	-11.0
160	2036429	639196	-13.5	-11.5
165	2036435	639212	-13.5	-11.5
170	2036440	639227	-14.0	-12.0
175	2036446	639242	-15.5	-13.5
180	2036452	639258	-15.5	-13.5
185	2036458	639273	-15.8	-13.8
190	2036464	639288	-15.7	-13.7
195	2036470	639304	-16.0	-14.0
200	2036475	639319	-15.5	-13.5
205	2036481	639334	-16.5	-14.5
210	2036487	639350	-17.5	-15.5
215	2036493	639365	-16.0	-14.0
220	2036499	639380	-16.7	-14.7
225	2036504	639396	-16.5	-14.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
230	2036510	639411	-16.5	-14.5
235	2036516	639426	-16.5	-14.5
240	2036522	639442	-17.0	-15.0
245	2036528	639457	-17.5	-15.5
250	2036534	639472	-17.5	-15.5
255	2036539	639488	-17.0	-15.0
260	2036545	639503	-18.0	-16.0
265	2036551	639518	-18.7	-16.7
270	2036557	639534	-18.5	-16.5
275	2036563	639549	-19.0	-17.0
280	2036568	639564	-20.0	-18.0
285	2036574	639580	-19.5	-17.5
290	2036580	639595	-18.5	-16.5
295	2036586	639610	-20.5	-18.5
300	2036592	639626	-20.9	-18.9
305	2036598	639641	-21.0	-19.0
310	2036603	639656	-21.5	-19.5
315	2036609	639672	-21.5	-19.5
320	2036615	639687	-21.8	-19.8
325	2036621	639702	-22.0	-20.0





1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N8300

June 16, 1994

Start/End Time: 1327/1334 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2000.000

Low Water Datum [LWD] Correction feet -2.50

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
2036074.204	638627.385	5.898	7.9585	
2036078.593	638640.641	5.426	7.4865	
2036084.150	638654.727	4.302	6.3625	
2036090.277	638670.521	3.968	6.0285	
2036096.238	638686.095	3.211	5.2715	
2036101.359	638700.292	1.913	3.9735	
2036104.044	638708.514	0.958	3.0185	
2036106.409	638714.130	0.308	2.3685	
2036107.133	638717.603	-0.360	1.7005	
2036107.693	638725.558	-1.556	0.5045	
2036112.676	638729.982	-1.981	0.0795	
2036114.961	638741.422	-3.036	-0.9755	
2036119.754	638753.649	-3.784	-1.7235	
2036124.771	638765.090	-4.301	-2.2405	
2036129.360	638774.543	-4.561	-2.5005	
2036133.268	638782.311	-4.809	-2.7485	

Fathometer Data

15	2036118	638743	-3.6	-1.5
20	2036124	638758	-4.8	-2.7
25	2036129	638774	-5.6	-3.5
30	2036135	638789	-5.6	-3.5
35	2036141	638804	-6.4	-4.3
40	2036147	638820	-6.6	-4.5
45	2036153	638835	-5.6	-3.5
50	2036159	638850	-4.6	-2.5
55	2036164	638866	-4.3	-2.2
60	2036170	638881	-4.8	-2.7
65	2036176	638896	-5.6	-3.5
70	2036182	638912	-6.6	-4.5
75	2036188	638927	-7.1	-5.0
80	2036193	638942	-7.9	-5.8
85	2036199	638958	-8.6	-6.5
90	2036205	638973	-8.8	-6.7
95	2036211	638988	-9.6	-7.5
100	2036217	639004	-9.6	-7.5
105	2036223	639019	-10.3	-8.2
110	2036228	639034	-10.1	-8.0
115	2036234	639050	-10.6	-8.5
120	2036240	639065	-10.6	-8.5
125	2036246	639081	-11.1	-9.0
130	2036252	639096	-11.6	-9.5
135	2036257	639111	-11.8	-9.7
140	2036263	639127	-12.1	-10.0
145	2036269	639142	-12.6	-10.5
150	2036275	639157	-13.1	-11.0
155	2036281	639173	-13.6	-11.5
160	2036287	639188	-13.8	-11.7
165	2036292	639203	-13.1	-11.0
170	2036298	639219	-13.1	-11.0
175	2036304	639234	-13.6	-11.5
180	2036310	639249	-13.2	-11.1
185	2036316	639265	-13.1	-11.0
190	2036321	639280	-13.1	-11.0
195	2036327	639295	-13.6	-11.5
200	2036333	639311	-14.6	-12.5
205	2036339	639326	-15.6	-13.5
210	2036345	639341	-15.6	-13.5
215	2036351	639357	-15.8	-13.7
220	2036356	639372	-16.6	-14.5
225	2036362	639387	-16.6	-14.5
230	2036368	639403	-16.6	-14.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
235	2036374	639418	-16.8	-14.7
240	2036380	639433	-16.6	-14.5
245	2036385	639449	-18.0	-15.9
250	2036391	639464	-18.4	-16.3
255	2036397	639479	-18.1	-16.0
260	2036403	639495	-17.6	-15.5
265	2036409	639510	-18.6	-16.5
270	2036415	639525	-19.4	-17.3
275	2036420	639541	-19.6	-17.5
280	2036426	639556	-19.6	-17.5
285	2036432	639571	-19.6	-17.5
290	2036438	639587	-18.6	-16.5
295	2036444	639602	-19.1	-17.0
300	2036449	639617	-19.2	-17.1
305	2036455	639633	-20.6	-18.5
310	2036461	639648	-21.1	-19.0
315	2036467	639663	-20.1	-18.0
320	2036473	639679	-20.6	-18.5
325	2036479	639694	-21.6	-19.5
330	2036484	639709	-21.6	-19.5
335	2036490	639725	-22.6	-20.5



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N8230

June 16, 1994

Start/End Time: 1310/1319 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2000.000

Low Water Datum [LWD] Correction feet -2.47

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2036008.522	638652.953	7.620	9.6805
2036012.608	638663.760	7.127	9.1875
2036019.731	638683.649	5.706	7.7665
2036026.509	638701.158	3.973	6.0335
2036033.698	638717.759	1.943	4.0035
2036037.228	638728.563	1.035	3.0955
2036039.653	638736.035	0.108	2.1685
2036040.848	638738.655	-0.336	1.7245
2036043.654	638744.811	-1.437	0.6235
2036046.670	638751.045	-2.437	-0.3765
2036051.090	638764.292	-3.220	-1.1595
2036056.520	638778.804	-3.442	-1.3815
2036062.035	638791.750	-3.509	-1.4485
2036066.875	638806.572	-3.839	-1.7785
2036071.891	638818.687	-4.312	-2.2515
2036075.520	638830.467	-4.638	-2.5775
2036082.197	638846.889	-4.750	-2.6895

Fathometer Data

7	2036043	638743	-2.6	-0.5
10	2036047	638753	-3.1	-1.0
15	2036052	638768	-3.6	-1.5
20	2036058	638783	-3.9	-1.8
25	2036064	638799	-4.1	-2.0
30	2036070	638814	-4.6	-2.5
35	2036076	638829	-5.1	-3.0
40	2036081	638845	-4.9	-2.8
45	2036087	638860	-4.6	-2.5
50	2036093	638875	-4.6	-2.5
55	2036099	638891	-4.4	-2.3
60	2036105	638906	-4.6	-2.5
65	2036111	638921	-5.6	-3.5
70	2036116	638937	-6.3	-4.2
75	2036122	638952	-6.6	-4.5
80	2036128	638967	-7.6	-5.5
85	2036134	638983	-8.6	-6.5
90	2036140	638998	-8.6	-6.5
95	2036145	639013	-9.1	-7.0
100	2036151	639029	-9.6	-7.5
105	2036157	639044	-9.9	-7.8
110	2036163	639059	-10.1	-8.0
115	2036169	639075	-10.6	-8.5
120	2036175	639090	-10.7	-8.6
125	2036180	639105	-11.1	-9.0
130	2036186	639121	-11.6	-9.5
135	2036192	639136	-11.8	-9.7
140	2036198	639151	-12.6	-10.5
145	2036204	639167	-12.7	-10.6
150	2036209	639182	-13.6	-11.5
155	2036215	639197	-12.6	-10.5
160	2036221	639213	-12.6	-10.5
165	2036227	639228	-12.6	-10.5
170	2036233	639243	-12.6	-10.5
175	2036239	639259	-12.6	-10.5
180	2036244	639274	-13.0	-10.9
185	2036250	639289	-13.6	-11.5
190	2036256	639305	-13.6	-11.5
195	2036262	639320	-14.9	-12.8
200	2036268	639335	-15.8	-13.7
205	2036273	639351	-15.4	-13.3
210	2036279	639366	-16.6	-14.5
215	2036285	639381	-16.6	-14.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
220	2036291	639397	-16.6	-14.5
225	2036297	639412	-16.6	-14.5
230	2036303	639427	-17.4	-15.3
235	2036308	639443	-18.1	-16.0
240	2036314	639458	-17.6	-15.5
245	2036320	639473	-16.8	-14.7
250	2036326	639489	-16.6	-14.5
255	2036332	639504	-17.4	-15.3
260	2036337	639519	-17.6	-15.5
265	2036343	639535	-18.6	-16.5
270	2036349	639550	-19.6	-17.5
275	2036355	639565	-19.6	-17.5
280	2036361	639581	-18.6	-16.5
285	2036367	639596	-19.1	-17.0
290	2036372	639611	-19.6	-17.5
295	2036378	639627	-20.6	-18.5
300	2036384	639642	-20.6	-18.5
305	2036390	639657	-20.6	-18.5
310	2036396	639673	-20.6	-18.5
315	2036402	639688	-21.1	-19.0
320	2036407	639703	-21.1	-19.0
325	2036413	639719	-20.6	-18.5
330	2036419	639734	-20.6	-18.5
335	2036425	639750	-21.6	-19.5
340	2036431	639765	-21.7	-19.6
345	2036436	639780	-20.6	-18.5
350	2036442	639796	-20.6	-18.5
355	2036448	639811	-21.8	-19.7
360	2036454	639826	-20.6	-18.5
365	2036460	639842	-20.6	-18.5
370	2036466	639857	-21.9	-19.8
375	2036471	639872	-22.6	-20.5



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N8200

June 16, 1994

Start/End Time: 1256/1303 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2000.000

Low Water Datum [LWD] Correction feet -2.44

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035982.579	638668.372	8.843	10.9035
	2035989.148	638686.211	7.410	9.4705
	2035996.307	638705.641	5.190	7.2505
	2036002.510	638723.100	3.233	5.2935
	2036007.015	638737.229	1.601	3.6615
	2036009.649	638745.308	1.254	3.3145
	2036011.899	638751.579	0.299	2.3595
	2036014.000	638755.299	-0.391	1.6695
	2036016.714	638760.913	-1.369	0.6915
	2036018.973	638767.379	-2.652	-0.5915
	2036022.629	638776.729	-3.531	-1.4705
	2036027.188	638790.778	-3.791	-1.7305
	2036032.151	638804.083	-3.883	-1.8225
	2036037.350	638820.424	-4.119	-2.0585
	2036043.160	638831.491	-4.218	-2.1575
	2036048.069	638844.049	-4.436	-2.3755
	2036052.755	638858.470	-4.552	-2.4915
	2036057.681	638872.992	-4.543	-2.4825

Fathometer Data

10	2036018	638763	-3.6	-1.6
15	2036024	638779	-4.1	-2.1
20	2036030	638794	-4.2	-2.2
25	2036036	638809	-4.5	-2.5
30	2036042	638825	-4.6	-2.6
35	2036048	638840	-4.7	-2.7
40	2036053	638855	-5.0	-3.0
45	2036059	638871	-5.1	-3.1
50	2036065	638886	-5.1	-3.1
55	2036071	638901	-5.4	-3.4
60	2036077	638917	-5.6	-3.6
65	2036082	638932	-5.6	-3.6
70	2036088	638947	-5.8	-3.8
75	2036094	638963	-6.8	-4.8
80	2036100	638978	-7.6	-5.6
85	2036106	638993	-8.0	-6.0
90	2036112	639009	-8.6	-6.6
95	2036117	639024	-9.4	-7.4
100	2036123	639039	-9.6	-7.6
105	2036129	639055	-10.0	-8.0
110	2036135	639070	-10.1	-8.1
115	2036141	639085	-10.6	-8.6
120	2036147	639101	-11.1	-9.1
125	2036152	639116	-11.6	-9.6
130	2036158	639131	-11.8	-9.8
135	2036164	639147	-12.0	-10.0
140	2036170	639162	-12.3	-10.3
145	2036176	639177	-12.6	-10.6
150	2036181	639193	-13.6	-11.6
155	2036187	639208	-13.6	-11.6
160	2036193	639223	-13.1	-11.1
165	2036199	639239	-12.6	-10.6
170	2036205	639254	-12.6	-10.6
175	2036211	639269	-13.6	-11.6
180	2036216	639285	-14.2	-12.2
185	2036222	639300	-14.1	-12.1
190	2036228	639315	-14.6	-12.6
195	2036234	639331	-15.6	-13.6
200	2036240	639346	-15.6	-13.6
205	2036245	639361	-15.1	-13.1
210	2036251	639377	-15.1	-13.1
215	2036257	639392	-16.1	-14.1

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
220	2036263	639407	-16.3	-14.3
225	2036269	639423	-16.9	-14.9
230	2036275	639438	-17.4	-15.4
235	2036280	639453	-18.4	-16.4
240	2036286	639469	-17.8	-15.8
245	2036292	639484	-18.0	-16.0
250	2036298	639499	-17.9	-15.9
255	2036304	639515	-18.1	-16.1
260	2036309	639530	-18.6	-16.6
265	2036315	639545	-18.6	-16.6
270	2036321	639561	-18.8	-16.8
275	2036327	639576	-18.8	-16.8
280	2036333	639591	-19.1	-17.1
285	2036339	639607	-19.8	-17.8
290	2036344	639622	-19.6	-17.6
295	2036350	639637	-20.6	-18.6
300	2036356	639653	-20.6	-18.6
305	2036362	639668	-19.6	-17.6
310	2036368	639683	-20.1	-18.1
315	2036373	639699	-20.6	-18.6
320	2036379	639714	-20.6	-18.6
325	2036385	639729	-21.6	-19.6
330	2036391	639745	-20.8	-18.8
335	2036397	639760	-19.6	-17.6
340	2036403	639775	-19.7	-17.7
345	2036408	639791	-21.6	-19.6
350	2036414	639806	-21.8	-19.8
355	2036420	639821	-22.0	-20.0





1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N8030

June 16, 1994

Start/End Time: 1238/1247 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2238.250

Low Water Datum [LWD] Correction feet -2.44

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
	2035816.397	638709.742	10.052	12.1125
	2035817.154	638711.456	9.694	11.7545
	2035830.748	638746.808	8.918	10.9785
	2035845.707	638787.320	7.920	9.9805
	2035855.308	638813.777	7.456	9.5165
	2035861.252	638829.026	7.199	9.2595
	2035861.575	638829.381	6.169	8.2295
	2035867.947	638844.763	5.548	7.6085
	2035881.116	638878.858	3.633	5.6935
	2035895.189	638915.338	2.366	4.4265
	2035905.662	638942.907	1.483	3.5435
	2035912.519	638963.425	1.036	3.0965
	2035914.475	638969.773	0.518	2.5785
	2035915.731	638970.595	0.503	2.5635
	2035917.383	638974.058	0.123	2.1835
	2035919.463	638980.355	-0.517	1.5435
	2035919.903	638983.775	-1.144	0.9165
	2035921.991	638990.653	-1.713	0.3475
	2035923.312	638993.356	-0.539	1.5215
	2035923.607	638997.890	-4.375	-2.3145
	2035924.750	638998.134	4.518	6.5785
	2035928.296	639004.486	6.520	8.5805
	2035932.947	639015.403	7.737	9.7975
	2035936.509	639023.259	6.671	8.7315
	2035938.920	639029.396	4.567	6.6275
	2035940.397	639033.924	2.514	4.5745
	2035942.909	639033.931	-2.808	-0.7475
	2035943.231	639036.643	-6.979	-4.9185

Fathometer Data

8	2035941.725	639040.145	-7.216	-5.2
10	2035944.052	639046.280	-7.416	-5.4
15	2035949.872	639061.618	-8.116	-6.1
20	2035955.691	639076.955	-8.316	-6.3
25	2035961.510	639092.292	-8.616	-6.6
30	2035967.330	639107.630	-9.116	-7.1
35	2035973.149	639122.967	-9.616	-7.6
40	2035978.968	639138.304	-10.016	-8.0
45	2035984.787	639153.642	-10.116	-8.1
50	2035990.607	639168.979	-10.616	-8.6
55	2035996.426	639184.316	-11.416	-9.4
60	2036002.245	639199.654	-12.016	-10.0
65	2036008.065	639214.991	-12.616	-10.6
70	2036013.884	639230.328	-12.616	-10.6
75	2036019.703	639245.666	-12.816	-10.8
80	2036025.523	639261.003	-13.616	-11.6
85	2036031.342	639276.340	-13.616	-11.6
90	2036037.161	639291.677	-13.616	-11.6
95	2036042.980	639307.015	-13.616	-11.6
100	2036048.800	639322.352	-13.616	-11.6
105	2036054.619	639337.689	-14.616	-12.6
110	2036060.438	639353.027	-14.816	-12.8
115	2036066.258	639368.364	-14.816	-12.8
120	2036072.077	639383.701	-14.616	-12.6
125	2036077.896	639399.039	-14.716	-12.7
130	2036083.716	639414.376	-14.816	-12.8
135	2036089.535	639429.713	-15.616	-13.6
140	2036095.354	639445.051	-15.616	-13.6
145	2036101.174	639460.388	-15.816	-13.8
150	2036106.993	639475.725	-16.616	-14.6
155	2036112.812	639491.063	-17.116	-15.1
160	2036118.631	639506.400	-17.616	-15.6

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
165	2036124.451	639521.737	-18.116	-16.1
170	2036130.270	639537.075	-17.616	-15.6
175	2036136.089	639552.412	-18.616	-16.6
180	2036141.909	639567.749	-18.016	-16.0
185	2036147.728	639583.087	-17.116	-15.1
190	2036153.547	639598.424	-17.116	-15.1
195	2036159.367	639613.761	-16.416	-14.4
200	2036165.186	639629.099	-16.616	-14.6
205	2036171.005	639644.436	-19.116	-17.1
210	2036176.825	639659.773	-19.616	-17.6
215	2036182.644	639675.111	-18.616	-16.6
220	2036188.463	639690.448	-19.616	-17.6
225	2036194.282	639705.785	-20.116	-18.1
230	2036200.102	639721.122	-20.616	-18.6
235	2036205.921	639736.460	-21.016	-19.0
240	2036211.740	639751.797	-21.016	-19.0
245	2036217.560	639767.134	-21.116	-19.1
250	2036223.379	639782.472	-20.116	-18.1
255	2036229.198	639797.809	-20.616	-18.6
260	2036235.018	639813.146	-21.116	-19.1
265	2036240.837	639828.484	-21.616	-19.6
270	2036246.656	639843.821	-21.616	-19.6
275	2036252.476	639859.158	-21.016	-19.0
280	2036258.295	639874.496	-21.616	-19.6
285	2036264.114	639889.833	-22.616	-20.6



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N7850

June 16, 1994

Start/End Time: 1219/1227 CST

MiniRanger (Mr) Easting:

Lake Forest Coordinates [LFC] feet

2000.000

Low Water Datum [LWD] Correction feet

-2.46

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
2035675.641	638845.878	6.716	8.7765	
2035680.130	638858.235	6.405	8.4655	
2035680.139	638858.625	6.094	8.1545	
2035685.586	638873.045	5.205	7.2655	
2035690.144	638884.093	4.757	6.8175	
2035690.886	638887.174	4.653	6.7135	
2035599.634	638927.627	4.687	6.7475	
2035698.142	638906.121	3.511	5.5715	
2035704.978	638924.073	3.039	5.0995	
2035710.816	638939.414	2.340	4.4005	
2035715.772	638951.377	1.205	3.2655	
2035718.155	638956.426	0.438	2.4985	
2035719.055	638958.748	0.126	2.1865	
2035720.476	638962.925	-0.553	1.5075	
2035722.727	638967.516	-1.207	0.8535	
2035724.423	638973.243	-1.779	0.2815	
2035729.737	638987.095	-2.969	-0.9085	
2035734.574	638999.281	-3.561	-1.5005	
2035740.498	639012.994	-4.183	-2.1225	
2035744.990	639025.035	-4.479	-2.4185	
2035748.381	639033.501	-4.831	-2.7705	

Fathometer Data

37	2035723	638970	-2.1	0.0
40	2035726	638979	-2.6	-0.5
45	2035732	638995	-3.4	-1.3
50	2035738	639010	-4.4	-2.3
55	2035744	639025	-5.1	-3.0
60	2035749	639041	-5.6	-3.5
65	2035755	639056	-6.0	-3.9
70	2035761	639071	-6.0	-3.9
75	2035767	639087	-5.8	-3.7
80	2035773	639102	-6.0	-3.9
85	2035779	639117	-6.1	-4.0
90	2035784	639133	-6.6	-4.5
95	2035790	639148	-7.1	-5.0
100	2035796	639163	-7.6	-5.5
105	2035802	639179	-8.1	-6.0
110	2035808	639194	-8.6	-6.5
115	2035813	639209	-9.1	-7.0
120	2035819	639225	-9.6	-7.5
125	2035825	639240	-10.6	-8.5
130	2035831	639255	-11.1	-9.0
135	2035837	639271	-11.1	-9.0
140	2035843	639286	-11.6	-9.5
145	2035848	639301	-12.6	-10.5
150	2035854	639317	-13.1	-11.0
155	2035860	639332	-13.4	-11.3
160	2035866	639347	-12.6	-10.5
165	2035872	639363	-13.1	-11.0
170	2035877	639378	-13.6	-11.5
175	2035883	639394	-14.0	-11.9
180	2035889	639409	-13.6	-11.5
185	2035895	639424	-13.6	-11.5
190	2035901	639440	-13.6	-11.5
195	2035907	639455	-13.6	-11.5
200	2035912	639470	-13.6	-11.5
205	2035918	639486	-14.1	-12.0
210	2035924	639501	-14.4	-12.3
215	2035930	639516	-14.6	-12.5
220	2035936	639532	-14.6	-12.5
225	2035941	639547	-14.8	-12.7

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
230	2035947	639562	-15.1	-13.0
235	2035953	639578	-15.8	-13.7
240	2035959	639593	-16.6	-14.5
245	2035965	639608	-17.1	-15.0
250	2035971	639624	-18.1	-16.0
255	2035976	639639	-18.1	-16.0
260	2035982	639654	-18.6	-16.5
265	2035988	639670	-18.6	-16.5
270	2035994	639685	-17.6	-15.5
275	2036000	639700	-19.6	-17.5
280	2036005	639716	-19.6	-17.5
285	2036011	639731	-19.0	-16.9
290	2036017	639746	-17.1	-15.0
295	2036023	639762	-17.6	-15.5
300	2036029	639777	-19.6	-17.5
305	2036035	639792	-20.1	-18.0
310	2036040	639808	-20.6	-18.5
315	2036046	639823	-20.6	-18.5
320	2036052	639838	-20.9	-18.8
325	2036058	639854	-20.9	-18.8
330	2036064	639869	-21.6	-19.5
335	2036069	639884	-21.6	-19.5
340	2036075	639900	-20.6	-18.5
345	2036081	639915	-21.1	-19.0
350	2036087	639930	-21.6	-19.5
355	2036093	639946	-22.1	-20.0



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N7750

June 16, 1994

Start/End Time: 1158/1205 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2000.000

Low Water Datum [LWD] Correction feet -2.47

MR Dist.	Northing (ft)	Easting (ft)	Elev. (ft)	Depth (ft)
(m)	[IL SPC]	[IL SPC]	[LFD]	[LWD]

Prism Pole Data

2035586.083	638891.972	6.659	8.7195
2035586.050	638892.133	6.659	8.7195
2035589.246	638899.812	6.477	8.5375
2035590.216	638902.470	6.919	8.9795
2035590.637	638903.431	5.679	7.7395
2035596.085	638917.664	5.251	7.3115
2035600.417	638930.273	4.499	6.5595
2035607.242	638948.851	3.711	5.7715
2035612.986	638964.197	3.520	5.5805
2035618.789	638980.281	2.533	4.5935
2035621.983	638991.920	1.511	3.5715
2035624.612	638997.191	1.068	3.1285
2035626.154	639001.644	0.382	2.4425
2035628.402	639004.313	-0.010	2.0505
2035628.897	639005.682	-0.266	1.7945
2035629.856	639012.057	-1.081	0.9795
2035631.870	639017.879	-1.741	0.3195
2035633.342	639021.674	-2.095	-0.0345
2035638.322	639031.124	-3.118	-1.0575
2035642.224	639041.255	-3.905	-1.8445
2035646.114	639049.460	-4.413	-2.3525
2035649.702	639058.520	-4.598	-2.5375

Fathometer Data

40	2035633	639015	-2.4	-0.3
45	2035638	639030	-3.2	-1.1
50	2035644	639046	-4.6	-2.5
55	2035650	639061	-5.1	-3.0
60	2035656	639076	-5.2	-3.1
65	2035662	639092	-5.6	-3.5
70	2035668	639107	-6.0	-3.9
75	2035673	639122	-6.4	-4.3
80	2035679	639138	-6.9	-4.8
85	2035685	639153	-7.6	-5.5
90	2035691	639168	-8.6	-6.5
95	2035697	639184	-8.6	-6.5
100	2035702	639199	-9.1	-7.0
105	2035708	639214	-9.2	-7.1
110	2035714	639230	-9.6	-7.5
115	2035720	639245	-9.6	-7.5
120	2035726	639260	-10.2	-8.1
125	2035732	639276	-10.6	-8.5
130	2035737	639291	-10.6	-8.5
135	2035743	639306	-11.0	-8.9
140	2035749	639322	-11.3	-9.2
145	2035755	639337	-11.6	-9.5
150	2035761	639352	-12.1	-10.0
155	2035767	639368	-13.6	-11.5
160	2035772	639383	-13.6	-11.5
165	2035778	639398	-13.6	-11.5
170	2035784	639414	-13.6	-11.5
175	2035790	639429	-13.1	-11.0
180	2035796	639444	-13.1	-11.0
185	2035801	639460	-13.0	-10.9
190	2035807	639475	-13.0	-10.9
195	2035813	639490	-13.1	-11.0
200	2035819	639506	-13.1	-11.0
205	2035825	639521	-13.6	-11.5
210	2035831	639536	-13.6	-11.5
215	2035836	639552	-14.1	-12.0
220	2035842	639567	-14.6	-12.5
225	2035848	639582	-14.8	-12.7

MR Dist.	Northing (ft)	Easting (ft)	Elev. (ft)	Depth (ft)
(m)	[IL SPC]	[IL SPC]	[LFD]	[LWD]
230	2035854	639598	-15.0	-12.9
235	2035860	639613	-16.1	-14.0
240	2035865	639628	-16.6	-14.5
245	2035871	639644	-16.6	-14.5
250	2035877	639659	-17.6	-15.5
255	2035883	639674	-17.8	-15.7
260	2035889	639690	-16.6	-14.5
265	2035895	639705	-16.1	-14.0
270	2035900	639720	-16.6	-14.5
275	2035906	639736	-17.6	-15.5
280	2035912	639751	-18.6	-16.5
285	2035918	639766	-18.6	-16.5
290	2035924	639782	-18.9	-16.8
295	2035929	639797	-19.6	-17.5
300	2035935	639812	-19.6	-17.5
305	2035941	639828	-19.1	-17.0
310	2035947	639843	-19.6	-17.5
315	2035953	639858	-19.4	-17.3
320	2035959	639874	-20.1	-18.0
325	2035964	639889	-20.6	-18.5
330	2035970	639904	-20.7	-18.6
335	2035976	639920	-20.6	-18.5
340	2035982	639935	-20.6	-18.5
345	2035988	639950	-20.8	-18.7
350	2035993	639966	-20.6	-18.5
355	2035999	639981	-20.6	-18.5
360	2036005	639996	-20.1	-18.0
365	2036011	640012	-20.1	-18.0
370	2036017	640027	-19.9	-17.8
375	2036023	640042	-21.1	-19.0
380	2036028	640058	-21.4	-19.3
385	2036034	640073	-21.6	-19.5
390	2036040	640088	-21.6	-19.5
395	2036046	640104	-22.1	-20.0





1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N7450

June 16, 1994

Start/End Time: 1134/1143 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2000.000

Low Water Datum [LWD] Correction feet -2.71

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2035301.780	638988.305	6.617	8.6775
2035305.382	638996.713	6.459	8.5195
2035305.591	638997.418	6.036	8.0965
2035308.142	639005.203	5.844	7.9045
2035308.800	639007.130	5.727	7.7875
2035316.394	639025.761	4.445	6.5055
2035322.316	639040.728	3.575	5.6355
2035323.082	639044.441	3.429	5.4895
2035326.843	639057.869	3.132	5.1925
2035335.415	639077.639	2.159	4.2195
2035339.071	639088.002	1.298	3.3585
2035342.087	639095.178	0.185	2.2455
2035342.246	639097.171	-0.009	2.0515
2035342.215	639097.806	-0.168	1.8925
2035345.161	639102.973	-0.796	1.2645
2035346.147	639106.965	-1.497	0.5635
2035353.838	639124.574	-2.080	-0.0195
2035358.763	639142.305	-2.499	-0.4385
2035364.012	639162.345	-2.404	-0.3435
2035376.428	639184.338	-2.109	-0.0485
2035379.676	639198.969	-2.725	-0.6645
2035386.716	639214.105	-3.460	-1.3995
2035391.892	639224.932	-4.168	-2.1075
2035393.673	639231.671	-4.829	-2.7685

Fathometer Data

65	2035381	639198	-2.9	-0.8
70	2035387	639213	-3.4	-1.3
75	2035393	639229	-4.4	-2.3
80	2035399	639244	-5.9	-3.8
85	2035405	639259	-6.4	-4.3
90	2035410	639275	-6.9	-4.8
95	2035416	639290	-7.4	-5.3
100	2035422	639305	-8.4	-6.3
105	2035428	639321	-9.4	-7.3
110	2035434	639336	-9.9	-7.8
115	2035439	639351	-10.9	-8.8
120	2035445	639367	-11.4	-9.3
125	2035451	639382	-11.4	-9.3
130	2035457	639397	-11.9	-9.8
135	2035463	639413	-12.4	-10.3
140	2035469	639428	-12.9	-10.8
145	2035474	639443	-12.9	-10.8
150	2035480	639459	-12.9	-10.8
155	2035486	639474	-12.6	-10.5
160	2035492	639489	-12.4	-10.3
165	2035498	639505	-12.5	-10.4
170	2035503	639520	-12.4	-10.3
175	2035509	639535	-13.4	-11.3
180	2035515	639551	-13.2	-11.1
185	2035521	639566	-13.4	-11.3
190	2035527	639581	-13.6	-11.5
195	2035533	639597	-14.4	-12.3
200	2035538	639612	-14.9	-12.8
205	2035544	639627	-15.4	-13.3
210	2035550	639643	-15.9	-13.8
215	2035556	639658	-16.2	-14.1
220	2035562	639673	-15.9	-13.8
225	2035567	639689	-16.4	-14.3
230	2035573	639704	-16.2	-14.1
235	2035579	639719	-16.2	-14.1
240	2035585	639735	-16.4	-14.3

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
245	2035591	639750	-16.4	-14.3
250	2035597	639765	-16.7	-14.6
255	2035602	639781	-17.4	-15.3
260	2035608	639796	-17.6	-15.5
265	2035614	639811	-18.4	-16.3
270	2035620	639827	-18.4	-16.3
275	2035626	639842	-18.4	-16.3
280	2035631	639857	-18.4	-16.3
285	2035637	639873	-18.6	-16.5
290	2035643	639888	-18.3	-16.2
295	2035649	639904	-18.4	-16.3
300	2035655	639919	-18.6	-16.5
305	2035661	639934	-19.4	-17.3
310	2035666	639950	-19.2	-17.1
315	2035672	639965	-19.4	-17.3
320	2035678	639980	-20.4	-18.3
325	2035684	639996	-19.9	-17.8
330	2035690	640011	-19.9	-17.8
335	2035696	640026	-19.9	-17.8
340	2035701	640042	-20.2	-18.1
345	2035707	640057	-20.4	-18.3
350	2035713	640072	-19.4	-17.3
355	2035719	640088	-20.4	-18.3
360	2035725	640103	-20.7	-18.6
365	2035730	640118	-19.9	-17.8
370	2035736	640134	-19.4	-17.3
375	2035742	640149	-20.7	-18.6
380	2035748	640164	-20.5	-18.4
385	2035754	640180	-20.9	-18.8
390	2035760	640195	-20.4	-18.3
395	2035765	640210	-20.4	-18.3
400	2035771	640226	-19.4	-17.3
405	2035777	640241	-18.4	-16.3
410	2035783	640256	-18.9	-16.8
415	2035789	640272	-19.6	-17.5
420	2035794	640287	-19.4	-17.3
425	2035800	640302	-19.5	-17.4
430	2035806	640318	-19.6	-17.5
435	2035812	640333	-19.4	-17.3
440	2035818	640348	-19.7	-17.6
445	2035824	640364	-19.6	-17.5
450	2035829	640379	-19.4	-17.3
455	2035835	640394	-19.9	-17.8
460	2035841	640410	-20.4	-18.3
465	2035847	640425	-20.9	-18.8
470	2035853	640440	-20.9	-18.8
475	2035858	640456	-20.4	-18.3
480	2035864	640471	-20.4	-18.3
485	2035870	640486	-20.4	-18.3
490	2035876	640502	-19.9	-17.8
495	2035882	640517	-19.9	-17.8
500	2035888	640532	-19.9	-17.8
505	2035893	640548	-20.4	-18.3
510	2035899	640563	-20.4	-18.3
515	2035905	640578	-21.4	-19.3
520	2035911	640594	-22.4	-20.3



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N7350

June 16, 1994

Start/End Time: 1116/1124 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet

2000.000

Low Water Datum [LWD] Correction feet

-2.41

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2035199.496	639000.209	6.674	8.7345
2035202.857	639008.937	6.424	8.4845
2035203.481	639011.373	6.893	8.9535
2035203.121	639012.339	5.282	7.3425
2035206.323	639018.660	5.042	7.1025
2035208.176	639023.368	4.862	6.9225
2035211.293	639031.495	4.519	6.5795
2035219.791	639053.527	3.645	5.7055
2035226.902	639072.058	3.548	5.6085
2035227.901	639075.666	3.344	5.4045
2035229.431	639080.771	3.144	5.2045
2035235.966	639096.327	1.781	3.8415
2035240.801	639109.427	0.323	2.3835
2035242.030	639112.888	-0.104	1.9565
2035242.165	639113.392	-0.205	1.8555
2035244.195	639118.401	-0.680	1.3805
2035249.080	639130.837	-1.311	0.7495
2035254.380	639144.583	-2.479	-0.4185
2035261.514	639162.120	-3.424	-1.3635
2035267.620	639179.788	-3.483	-1.4225
2035273.785	639196.352	-3.671	-1.6105
2035279.359	639209.480	-3.946	-1.8855
2035283.928	639221.157	-4.244	-2.1835
2035288.364	639234.197	-4.705	-2.6445

Fathometer Data

35	2035253	639141	-2.7	-0.6
40	2035259	639157	-3.7	-1.6
45	2035264	639172	-3.7	-1.6
50	2035270	639187	-3.9	-1.8
55	2035276	639203	-4.2	-2.1
60	2035282	639218	-4.7	-2.6
65	2035288	639233	-5.2	-3.1
70	2035294	639249	-5.6	-3.5
75	2035299	639264	-5.7	-3.6
80	2035305	639279	-5.7	-3.6
85	2035311	639295	-6.2	-4.1
90	2035317	639310	-6.7	-4.6
95	2035323	639325	-7.1	-5.0
100	2035329	639341	-7.7	-5.6
105	2035334	639356	-7.7	-5.6
110	2035340	639371	-7.7	-5.6
115	2035346	639387	-8.0	-5.9
120	2035352	639402	-8.0	-5.9
125	2035358	639418	-8.7	-6.6
130	2035363	639433	-9.1	-7.0
135	2035369	639448	-9.1	-7.0
140	2035375	639464	-10.5	-8.4
145	2035381	639479	-10.7	-8.6
150	2035387	639494	-10.9	-8.8
155	2035393	639510	-11.7	-9.6
160	2035398	639525	-12.7	-10.6
165	2035404	639540	-13.1	-11.0
170	2035410	639556	-13.7	-11.6
175	2035416	639571	-13.2	-11.1
180	2035422	639586	-13.1	-11.0
185	2035427	639602	-12.9	-10.8
190	2035433	639617	-12.9	-10.8
195	2035439	639632	-12.9	-10.8
200	2035445	639648	-12.7	-10.6
205	2035451	639663	-12.7	-10.6
210	2035457	639678	-12.7	-10.6

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
215	2035462	639694	-12.9	-10.8
220	2035468	639709	-13.1	-11.0
225	2035474	639724	-13.9	-11.8
230	2035480	639740	-14.7	-12.6
235	2035486	639755	-15.7	-13.6
240	2035491	639770	-16.5	-14.4
245	2035497	639786	-17.0	-14.9
250	2035503	639801	-17.7	-15.6
255	2035509	639816	-17.7	-15.6
260	2035515	639832	-17.5	-15.4
265	2035521	639847	-18.2	-16.1
270	2035526	639862	-17.7	-15.6
275	2035532	639878	-18.3	-16.2
280	2035538	639893	-18.2	-16.1
285	2035544	639908	-18.7	-16.6
290	2035550	639924	-18.7	-16.6
295	2035555	639939	-18.7	-16.6
300	2035561	639954	-18.2	-16.1
305	2035567	639970	-18.2	-16.1
310	2035573	639985	-18.2	-16.1
315	2035579	640000	-19.3	-17.2
320	2035585	640016	-19.7	-17.6
325	2035590	640031	-19.7	-17.6
330	2035596	640046	-19.2	-17.1
335	2035602	640062	-18.7	-16.6
340	2035608	640077	-19.2	-17.1
345	2035614	640092	-20.7	-18.6
350	2035619	640108	-20.2	-18.1
355	2035625	640123	-20.7	-18.6
360	2035631	640138	-20.2	-18.1
365	2035637	640154	-20.5	-18.4
370	2035643	640169	-21.0	-18.9
375	2035649	640184	-21.7	-19.6
380	2035654	640200	-20.9	-18.8
385	2035660	640215	-21.2	-19.1
390	2035666	640230	-20.7	-18.6
395	2035672	640246	-20.2	-18.1
400	2035678	640261	-20.2	-18.1
405	2035683	640276	-20.7	-18.6
410	2035689	640292	-20.7	-18.6
415	2035695	640307	-21.0	-18.9
420	2035701	640322	-21.7	-19.6
425	2035707	640338	-21.9	-19.8
430	2035713	640353	-21.7	-19.6
435	2035718	640368	-20.7	-18.6
440	2035724	640384	-19.9	-17.8
445	2035730	640399	-19.7	-17.6
450	2035736	640414	-19.7	-17.6
455	2035742	640430	-18.7	-16.6
460	2035747	640445	-19.2	-17.1
465	2035753	640460	-19.7	-17.6
470	2035759	640476	-20.2	-18.1
475	2035765	640491	-20.3	-18.2
480	2035771	640506	-20.4	-18.3
485	2035777	640522	-20.2	-18.1
490	2035782	640537	-20.7	-18.6
495	2035788	640552	-21.1	-19.0
500	2035794	640568	-20.7	-18.6
505	2035800	640583	-21.2	-19.1
510	2035806	640598	-20.7	-18.6
515	2035812	640614	-20.8	-18.7
520	2035817	640629	-21.2	-19.1
525	2035823	640644	-21.7	-19.6
530	2035829	640660	-21.7	-19.6
535	2035835	640675	-21.2	-19.1
540	2035841	640691	-20.7	-18.6
545	2035846	640706	-20.7	-18.6
550	2035852	640721	-21.2	-19.1
555	2035858	640737	-21.7	-19.6
560	2035864	640752	-21.7	-19.6
565	2035870	640767	-20.7	-18.6
570	2035876	640783	-20.7	-18.6
575	2035881	640798	-20.7	-18.6
580	2035887	640813	-20.8	-18.7
585	2035893	640829	-21.7	-19.6



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N7000

July 18, 1994

Start/End Time: 1101/1112 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 1995.950

Low Water Datum [LWD] Correction feet -2.77

MR Dist.	Northing (ft)	Easting (ft)	Elev. (ft)	Depth (ft)
(m)	[IL SPC]	[IL SPC]	[LFD]	[LWD]

Prism Pole Data

2034849.235	639064.059	6.953	9.0135
2034849.396	639064.960	5.263	7.3235
2034854.423	639078.073	5.361	7.4215
2034862.228	639096.864	5.293	7.3535
2034864.657	639104.703	5.512	7.5725
2034867.432	639112.086	5.359	7.4195
2034873.062	639125.179	4.969	7.0295
2034879.676	639142.335	4.196	6.2565
2034880.376	639146.735	4.018	6.0785
2034884.814	639158.211	3.670	5.7305
2034884.882	639158.400	3.725	5.7855
2034887.469	639166.928	3.412	5.4725
2034893.059	639182.752	1.965	4.0255
2034896.994	639191.613	1.145	3.2055
2034898.993	639195.600	0.637	2.6975
2034899.784	639210.043	-1.224	0.8365
2034899.429	639223.528	-2.129	-0.0685
2034910.201	639231.358	-2.536	-0.4755
2034913.582	639242.109	-3.021	-0.9605
2034916.264	639242.528	-3.096	-1.0355
2034918.735	639252.767	-3.424	-1.3635
2034922.713	639261.364	-3.626	-1.5655

Fathometer Data

17	2034905	639210	-1.4	0.7
20	2034908	639220	-2.1	0.0
25	2034914	639235	-2.8	-0.7
30	2034920	639250	-3.4	-1.3
35	2034926	639266	-4.0	-1.9
40	2034931	639281	-4.3	-2.2
45	2034937	639296	-4.9	-2.8
50	2034943	639312	-5.8	-3.7
55	2034949	639327	-6.3	-4.2
60	2034955	639342	-6.7	-4.6
65	2034961	639358	-7.4	-5.3
70	2034966	639373	-7.6	-5.5
75	2034972	639388	-7.8	-5.7
80	2034978	639404	-8.3	-6.2
85	2034984	639419	-8.7	-6.6
90	2034990	639434	-9.2	-7.1
95	2034995	639450	-9.5	-7.4
100	2035001	639465	-9.8	-7.7
105	2035007	639480	-10.3	-8.2
110	2035013	639496	-10.3	-8.2
115	2035019	639511	-10.8	-8.7
120	2035025	639526	-10.8	-8.7
125	2035030	639542	-10.8	-8.7
130	2035036	639557	-10.8	-8.7
135	2035042	639572	-10.9	-8.8
140	2035048	639588	-10.8	-8.7
145	2035054	639603	-11.3	-9.2
150	2035059	639618	-11.3	-9.2
155	2035065	639634	-11.3	-9.2
160	2035071	639649	-11.3	-9.2
165	2035077	639664	-11.3	-9.2
170	2035083	639680	-11.5	-9.4
175	2035089	639695	-11.8	-9.7
180	2035094	639710	-11.8	-9.7
185	2035100	639726	-12.3	-10.2
190	2035106	639741	-12.3	-10.2
195	2035112	639756	-11.5	-9.4
200	2035118	639772	-12.8	-10.7

MR Dist.	Northing (ft)	Easting (ft)	Elev. (ft)	Depth (ft)
(m)	[IL SPC]	[IL SPC]	[LFD]	[LWD]
205	2035123	639787	-13.3	-11.2
210	2035129	639802	-13.8	-11.7
215	2035135	639818	-14.8	-12.7
220	2035141	639833	-15.3	-13.2
225	2035147	639848	-15.3	-13.2
230	2035153	639864	-15.3	-13.2
235	2035158	639879	-16.3	-14.2
240	2035164	639894	-17.3	-15.2
245	2035170	639910	-18.3	-16.2
250	2035176	639925	-17.3	-15.2
255	2035182	639940	-17.3	-15.2
260	2035187	639956	-18.3	-16.2
265	2035193	639971	-18.8	-16.7
270	2035199	639986	-18.3	-16.2
275	2035205	640002	-17.3	-15.2
280	2035211	640017	-17.3	-15.2
285	2035217	640032	-17.8	-15.7
290	2035222	640048	-17.8	-15.7
295	2035228	640063	-18.8	-16.7
300	2035234	640078	-18.8	-16.7
305	2035240	640094	-18.8	-16.7
310	2035246	640109	-18.8	-16.7
315	2035251	640124	-18.3	-16.2
320	2035257	640140	-18.3	-16.2
325	2035263	640155	-18.8	-16.7
330	2035269	640170	-18.8	-16.7
335	2035275	640186	-18.8	-16.7
340	2035281	640201	-18.8	-16.7
345	2035286	640216	-19.3	-17.2
350	2035292	640232	-20.3	-18.2
355	2035298	640247	-20.3	-18.2
360	2035304	640262	-20.3	-18.2
365	2035310	640278	-20.8	-18.7
370	2035315	640293	-20.3	-18.2
375	2035321	640308	-19.8	-17.7
380	2035327	640324	-19.8	-17.7
385	2035333	640339	-19.3	-17.2
390	2035339	640355	-19.3	-17.2
395	2035345	640370	-19.8	-17.7
400	2035350	640385	-19.8	-17.7
405	2035356	640401	-19.8	-17.7
410	2035362	640416	-19.9	-17.8
415	2035368	640431	-20.3	-18.2
420	2035374	640447	-20.8	-18.7
425	2035380	640462	-21.3	-19.2
430	2035385	640477	-21.3	-19.2
435	2035391	640493	-21.3	-19.2
440	2035397	640508	-21.3	-19.2
445	2035403	640523	-21.3	-19.2
450	2035409	640539	-21.8	-19.7
455	2035414	640554	-21.8	-19.7
460	2035420	640569	-21.8	-19.7
465	2035426	640585	-21.8	-19.7
470	2035432	640600	-21.3	-19.2
475	2035438	640615	-21.1	-19.0
480	2035444	640631	-21.3	-19.2
485	2035449	640646	-21.8	-19.7
490	2035455	640661	-22.1	-20.0







1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N6900

July 18, 1994

Start/End Time: 1127/1137 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2000.000

Low Water Datum [LWD] Correction feet -2.83

MR Dist.	Northing (ft)	Easting (ft)	Elev. (ft)	Depth (ft)
(m)	[IL SPC]	[IL SPC]	[LFD]	[LWD]

Prism Pole Data

2034747.415	639079.703	7.013	9.0735
2034747.619	639079.916	5.051	7.1115
2034754.233	639096.723	4.657	6.7175
2034763.343	639119.896	4.651	6.7115
2034767.327	639130.493	4.658	6.7185
2034769.439	639135.995	4.555	6.6155
2034779.907	639161.883	4.193	6.2535
2034787.678	639182.948	4.218	6.2785
2034791.464	639193.615	3.562	5.6225
2034791.439	639193.745	3.589	5.6495
2034796.924	639207.758	2.030	4.0905
2034800.738	639217.988	0.648	2.7085
2034810.257	639241.487	-2.542	-0.4815
2034811.791	639247.536	-2.985	-0.9245
2034813.800	639254.169	-3.478	-1.4175
2034815.629	639259.04	-3.740	-1.6795

Fathometer Data

10	2034803	639224	-0.9	1.1
15	2034809	639240	-2.2	-0.2
20	2034815	639255	-3.2	-1.2
25	2034820	639270	-4.2	-2.2
30	2034826	639286	-4.7	-2.7
35	2034832	639301	-5.2	-3.2
40	2034838	639316	-5.4	-3.4
45	2034844	639332	-5.8	-3.8
50	2034850	639347	-6.2	-4.2
55	2034855	639362	-7.0	-5.0
60	2034861	639378	-7.2	-5.2
65	2034867	639393	-8.2	-6.2
70	2034873	639408	-8.3	-6.3
75	2034879	639424	-9.2	-7.2
80	2034884	639439	-9.7	-7.7
85	2034890	639454	-10.2	-8.2
90	2034896	639470	-10.4	-8.4
95	2034902	639485	-11.2	-9.2
100	2034908	639500	-12.2	-10.2
105	2034914	639516	-12.2	-10.2
110	2034919	639531	-13.2	-11.2
115	2034925	639546	-12.2	-10.2
120	2034931	639562	-12.7	-10.7
125	2034937	639577	-12.4	-10.4
130	2034943	639592	-13.2	-11.2
135	2034949	639608	-13.2	-11.2
140	2034954	639623	-12.7	-10.7
145	2034960	639638	-12.2	-10.2
150	2034966	639654	-11.7	-9.7
155	2034972	639669	-11.7	-9.7
160	2034978	639685	-11.7	-9.7
165	2034983	639700	-12.2	-10.2
170	2034989	639715	-12.2	-10.2
175	2034995	639731	-12.2	-10.2
180	2035001	639746	-12.6	-10.6
185	2035007	639761	-12.6	-10.6
190	2035013	639777	-13.2	-11.2
195	2035018	639792	-13.4	-11.4
200	2035024	639807	-13.7	-11.7
205	2035030	639823	-14.4	-12.4
210	2035036	639838	-15.2	-13.2
215	2035042	639853	-16.2	-14.2
220	2035047	639869	-16.2	-14.2
225	2035053	639884	-16.2	-14.2

MR Dist.	Northing (ft)	Easting (ft)	Elev. (ft)	Depth (ft)
(m)	[IL SPC]	[IL SPC]	[LFD]	[LWD]
230	2035059	639899	-16.2	-14.2
235	2035065	639915	-16.2	-14.2
240	2035071	639930	-16.2	-14.2
245	2035077	639945	-16.2	-14.2
250	2035082	639961	-16.2	-14.2
255	2035088	639976	-16.2	-14.2
260	2035094	639991	-16.2	-14.2
265	2035100	640007	-17.2	-15.2
270	2035106	640022	-17.2	-15.2
275	2035111	640037	-16.2	-14.2
280	2035117	640053	-17.2	-15.2
285	2035123	640068	-18.2	-16.2
290	2035129	640083	-17.2	-15.2
295	2035135	640099	-18.2	-16.2
300	2035141	640114	-17.5	-15.5
305	2035146	640129	-18.2	-16.2
310	2035152	640145	-18.2	-16.2
315	2035158	640160	-18.4	-16.4
320	2035164	640175	-19.2	-17.2
325	2035170	640191	-19.2	-17.2
330	2035175	640206	-18.6	-16.6
335	2035181	640221	-19.2	-17.2
340	2035187	640237	-19.7	-17.7
345	2035193	640252	-19.7	-17.7
350	2035199	640267	-19.8	-17.8
355	2035205	640283	-19.7	-17.7
360	2035210	640298	-19.2	-17.2
365	2035216	640313	-19.7	-17.7
370	2035222	640329	-19.7	-17.7
375	2035228	640344	-19.4	-17.4
380	2035234	640359	-19.4	-17.4
385	2035239	640375	-20.2	-18.2
390	2035245	640390	-20.2	-18.2
395	2035251	640405	-20.2	-18.2
400	2035257	640421	-20.7	-18.7
405	2035263	640436	-19.2	-17.2
410	2035269	640451	-19.2	-17.2
415	2035274	640467	-20.2	-18.2
420	2035280	640482	-20.2	-18.2
425	2035286	640497	-20.2	-18.2
430	2035292	640513	-20.2	-18.2
435	2035298	640528	-20.7	-18.7
440	2035303	640543	-21.2	-19.2
445	2035309	640559	-21.2	-19.2
450	2035315	640574	-21.2	-19.2
455	2035321	640589	-21.2	-19.2
460	2035327	640605	-21.2	-19.2
465	2035333	640620	-21.2	-19.2
470	2035338	640635	-21.2	-19.2
475	2035344	640651	-21.2	-19.2
480	2035350	640666	-21.2	-19.2
485	2035356	640681	-21.2	-19.2
490	2035362	640697	-21.2	-19.2
495	2035367	640712	-21.2	-19.2
500	2035373	640727	-20.7	-18.7
505	2035379	640743	-20.7	-18.7
510	2035385	640758	-21.2	-19.2
515	2035391	640773	-21.2	-19.2
520	2035397	640789	-20.2	-18.2
525	2035402	640804	-20.2	-18.2
530	2035408	640819	-21.2	-19.2
535	2035414	640835	-21.2	-19.2
540	2035420	640850	-21.4	-19.4
545	2035426	640865	-20.7	-18.7
550	2035432	640881	-21.2	-19.2
555	2035437	640896	-21.2	-19.2
560	2035443	640911	-21.2	-19.2
565	2035449	640927	-21.2	-19.2
570	2035455	640942	-20.4	-18.4
575	2035461	640958	-20.6	-18.6
580	2035466	640973	-21.2	-19.2
585	2035472	640988	-21.2	-19.2
590	2035478	641004	-21.2	-19.2
595	2035484	641019	-21.2	-19.2
600	2035490	641034	-21.2	-19.2



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N6700

July 18, 1994

Start/End Time: 1155/1204 CST

MiniRanger (MR) Easting:

Lake Forest Coordinate [LFC] feet 2191.034

Low Water Datum [LWD] Correction feet -2.89

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2034584.421	639212.985	6.892	8.9525
2034584.663	639213.158	5.044	7.1045
2034597.260	639239.776	4.335	6.3955
2034609.144	639267.936	3.480	5.5405
2034621.966	639314.169	2.030	4.0905
2034636.592	639351.174	2.383	4.4435
2034645.385	639373.238	1.573	3.6335
2034654.450	639394.371	2.501	4.5615
2034661.235	639408.537	1.805	3.8655
2034661.822	639412.425	4.910	6.9705
2034661.460	639415.653	8.066	10.1265
2034664.588	639424.319	9.108	11.1685
2034665.085	639425.206	6.710	8.7705
2034668.115	639432.405	6.852	8.9125
2034668.179	639432.814	8.387	10.4475
2034668.805	639433.988	8.382	10.4425
2034669.405	639434.647	9.598	11.6585
2034670.935	639438.458	9.487	11.5475
2034672.726	639443.491	7.681	9.7415
2034674.737	639448.063	6.993	9.0535
2034677.001	639452.387	2.867	4.9275
2034678.472	639453.974	-2.283	-0.2225
2034681.491	639461.338	-4.510	-2.4495
2034682.645	639462.459	-2.131	-0.0705

Fathometer Data

10	2034684	639474	-6.7	-4.6
15	2034690	639489	-7.7	-5.6
20	2034695	639505	-8.2	-6.1
25	2034701	639520	-9.2	-7.1
30	2034707	639535	-9.7	-7.6
35	2034713	639551	-10.2	-8.1
40	2034719	639566	-10.7	-8.6
45	2034725	639581	-10.8	-8.7
50	2034730	639597	-11.2	-9.1
55	2034736	639612	-11.5	-9.4
60	2034742	639627	-12.6	-10.5
65	2034748	639643	-13.7	-11.6
70	2034754	639658	-12.7	-10.6
75	2034759	639673	-11.7	-9.6
80	2034765	639689	-11.2	-9.1
85	2034771	639704	-11.2	-9.1
90	2034777	639719	-11.2	-9.1
95	2034783	639735	-11.2	-9.1
100	2034789	639750	-11.2	-9.1
105	2034794	639765	-11.5	-9.4
110	2034800	639781	-11.7	-9.6
115	2034806	639796	-11.9	-9.8
120	2034812	639811	-12.2	-10.1
125	2034818	639827	-12.2	-10.1
130	2034823	639842	-12.2	-10.1
135	2034829	639857	-12.7	-10.6
140	2034835	639873	-12.7	-10.6
145	2034841	639888	-13.2	-11.1
150	2034847	639903	-13.2	-11.1
155	2034853	639919	-13.2	-11.1
160	2034858	639934	-13.7	-11.6
165	2034864	639949	-14.2	-12.1
170	2034870	639965	-14.7	-12.6
175	2034876	639980	-15.2	-13.1
180	2034882	639995	-15.2	-13.1
185	2034887	640011	-16.2	-14.1

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
190	2034893	640026	-17.2	-15.1
195	2034899	640041	-17.2	-15.1
200	2034905	640057	-17.2	-15.1
205	2034911	640072	-17.7	-15.6
210	2034917	640087	-17.2	-15.1
215	2034922	640103	-18.2	-16.1
220	2034928	640118	-18.7	-16.6
225	2034934	640133	-19.2	-17.1
230	2034940	640149	-19.2	-17.1
235	2034946	640164	-17.7	-15.6
240	2034951	640179	-17.7	-15.6
245	2034957	640195	-17.2	-15.1
250	2034963	640210	-18.2	-16.1
255	2034969	640225	-18.2	-16.1
260	2034975	640241	-17.7	-15.6
265	2034981	640256	-18.2	-16.1
270	2034986	640271	-18.7	-16.6
275	2034992	640287	-18.7	-16.6
280	2034998	640302	-19.2	-17.1
285	2035004	640317	-18.4	-16.3
290	2035010	640333	-19.2	-17.1
295	2035016	640348	-18.7	-16.6
300	2035021	640364	-18.7	-16.6
305	2035027	640379	-17.7	-15.6
310	2035033	640394	-18.2	-16.1
315	2035039	640410	-18.2	-16.1
320	2035045	640425	-18.2	-16.1
325	2035050	640440	-19.2	-17.1
330	2035056	640456	-18.4	-16.3
335	2035062	640471	-19.2	-17.1
340	2035068	640486	-19.7	-17.6
345	2035074	640502	-20.2	-18.1
350	2035080	640517	-20.7	-18.6
355	2035085	640532	-20.7	-18.6
360	2035091	640548	-21.2	-19.1
365	2035097	640563	-20.7	-18.6
370	2035103	640578	-21.2	-19.1
375	2035109	640594	-21.4	-19.3
380	2035114	640609	-21.2	-19.1
385	2035120	640624	-22.2	-20.1



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N6417

June 15, 1994

Start/End Time: 1405/1414 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2228.407

Low Water Datum [LWD] Correction feet -2.60

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2034322.526	639320.612	5.941	8.0015
2034324.874	639326.327	5.854	7.9145
2034328.255	639334.596	5.673	7.7335
2034334.207	639347.175	5.470	7.5305
2034334.073	639348.044	5.977	8.0375
2034335.025	639348.232	-6.093	-4.0325
2034340.583	639357.402	-8.228	-6.1675
2034344.827	639368.061	-8.174	-6.1135
2034354.922	639391.891	-8.622	-6.5615
2034366.164	639419.284	-7.059	-4.9985
2034369.386	639430.110	-6.581	-4.5205
2034372.699	639438.834	-6.784	-4.7235
2034377.958	639454.765	-7.414	-5.5355
2034385.185	639476.801	-6.104	-4.0435
2034389.066	639485.544	-7.773	-5.7125
2034393.697	639495.608	-6.947	-4.8865
2034401.703	639512.609	-6.116	-4.0555
2034406.906	639525.652	-4.864	-2.8035
2034409.526	639531.512	-3.256	-1.1955
2034411.475	639538.171	-2.187	-0.1265
2034414.202	639544.163	-3.634	-1.5735
2034416.680	639548.551	3.369	5.4295
2034418.659	639553.923	5.956	8.0165
2034419.389	639558.114	6.132	8.1925
2034420.558	639566.819	10.051	12.1115
2034422.561	639572.235	9.551	11.6115
2034422.727	639577.885	8.675	10.7355
2034424.362	639580.985	8.876	10.9365
2034425.621	639584.472	6.583	8.6435
2034427.310	639592.933	1.163	3.2235
2034429.494	639593.390	-2.672	-0.6115
2034430.946	639598.540	-3.007	-0.9465

Fathometer Data

7	2034429	639600	-3.8	-1.7
12	2034435	639615	-4.7	-2.6
17	2034441	639631	-7.5	-5.4
22	2034446	639646	-10.7	-8.6
27	2034452	639661	-11.5	-9.4
32	2034458	639677	-12.5	-10.4
37	2034464	639692	-12.7	-10.6
42	2034470	639707	-13.0	-10.9
47	2034476	639723	-13.3	-11.2
52	2034481	639738	-13.5	-11.4
57	2034487	639753	-13.5	-11.4
62	2034493	639769	-13.5	-11.4
67	2034499	639784	-13.5	-11.4
72	2034505	639799	-13.7	-11.6
77	2034510	639815	-13.5	-11.4
82	2034516	639830	-14.0	-11.9
87	2034522	639845	-13.5	-11.4
92	2034528	639861	-13.5	-11.4
97	2034534	639876	-13.5	-11.4
102	2034540	639891	-13.7	-11.6
107	2034545	639907	-14.5	-12.4
112	2034551	639922	-14.4	-12.3
117	2034557	639938	-14.5	-12.4
122	2034563	639953	-14.5	-12.4
127	2034569	639968	-14.5	-12.4
132	2034574	639984	-15.0	-12.9
137	2034580	639999	-14.7	-12.6
142	2034586	640014	-15.0	-12.9

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
147	2034592	640030	-15.0	-12.9
152	2034598	640045	-14.9	-12.8
157	2034604	640060	-14.5	-12.4
162	2034609	640076	-15.5	-13.4
167	2034615	640091	-15.5	-13.4
172	2034621	640106	-15.8	-13.7
177	2034627	640122	-16.0	-13.9
182	2034633	640137	-15.9	-13.8
187	2034638	640152	-16.7	-14.6
192	2034644	640168	-16.0	-13.9
197	2034650	640183	-16.5	-14.4
202	2034656	640198	-16.5	-14.4
207	2034662	640214	-16.5	-14.4
212	2034668	640229	-17.0	-14.9
217	2034673	640244	-16.5	-14.4
222	2034679	640260	-16.5	-14.4
227	2034685	640275	-17.5	-15.4
232	2034691	640290	-17.5	-15.4
237	2034697	640306	-18.0	-15.9
242	2034702	640321	-18.5	-16.4
247	2034708	640336	-18.5	-16.4
252	2034714	640352	-18.0	-15.9
257	2034720	640367	-17.5	-15.4
262	2034726	640382	-18.0	-15.9
267	2034732	640398	-18.5	-16.4
272	2034737	640413	-18.5	-16.4
277	2034743	640428	-19.1	-17.0
282	2034749	640444	-19.0	-16.9
287	2034755	640459	-18.5	-16.4
292	2034761	640474	-18.5	-16.4
297	2034766	640490	-17.5	-15.4
302	2034772	640505	-18.3	-16.2
307	2034778	640520	-18.7	-16.6
312	2034784	640536	-18.9	-16.8
317	2034790	640551	-18.7	-16.6
322	2034796	640566	-18.9	-16.8
327	2034801	640582	-18.7	-16.6
332	2034807	640597	-19.0	-16.9
337	2034813	640612	-19.5	-17.4
342	2034819	640628	-19.0	-16.9
347	2034825	640643	-19.7	-17.6
352	2034831	640658	-20.0	-17.9
357	2034836	640674	-20.1	-18.0
362	2034842	640689	-20.5	-18.4
367	2034848	640704	-20.0	-17.9
372	2034854	640720	-20.3	-18.2
377	2034860	640735	-20.0	-17.9
382	2034865	640750	-20.5	-18.4
387	2034871	640766	-21.0	-18.9
392	2034877	640781	-20.5	-18.4
397	2034883	640796	-21.0	-18.9
402	2034889	640812	-20.5	-18.4
407	2034895	640827	-20.0	-17.9
412	2034900	640842	-21.5	-19.4
417	2034906	640858	-21.5	-19.4
422	2034912	640873	-21.0	-18.9
427	2034918	640888	-21.5	-19.4
432	2034924	640904	-22.0	-19.9
437	2034929	640919	-21.5	-19.4
442	2034935	640934	-21.7	-19.6
447	2034941	640950	-22.0	-19.9
452	2034947	640965	-22.5	-20.4





1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N6217

June 15, 1994

Start/End Time: 1348/1356 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2000.553

Low Water Datum [LWD] Correction feet -2.61

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2034148.323	639425.135	8.286	10.3465
2034152.474	639435.595	8.158	10.2185
2034152.632	639435.842	9.341	11.4015
2034153.024	639436.512	9.341	11.4015
2034153.001	639436.797	7.342	9.4025
2034157.616	639449.015	6.479	8.5395
2034160.646	639455.843	1.429	3.4895
2034160.661	639459.245	-0.372	1.6885

Fathometer Data

8	2034162	639461	-5.0	-2.9
10	2034165	639467	-5.2	-3.1
15	2034170	639483	-5.2	-3.1
20	2034176	639498	-6.0	-3.9
25	2034182	639513	-5.8	-3.7
30	2034188	639529	-6.0	-3.9
35	2034194	639544	-6.3	-4.2
40	2034200	639559	-6.7	-4.6
45	2034205	639575	-7.0	-4.9
50	2034211	639590	-7.5	-5.4
55	2034217	639605	-7.5	-5.4
60	2034223	639621	-7.5	-5.4
65	2034229	639636	-7.6	-5.5
70	2034234	639651	-8.0	-5.9
75	2034240	639667	-8.7	-6.6
80	2034246	639682	-9.5	-7.4
85	2034252	639697	-10.0	-7.9
90	2034258	639713	-11.0	-8.9
95	2034264	639728	-12.0	-9.9
100	2034269	639743	-12.5	-10.4
105	2034275	639759	-12.7	-10.6
110	2034281	639774	-13.0	-10.9
115	2034287	639789	-13.0	-10.9
120	2034293	639805	-13.1	-11.0
125	2034298	639820	-13.3	-11.2
130	2034304	639835	-13.5	-11.4
135	2034310	639851	-13.5	-11.4
140	2034316	639866	-13.0	-10.9
145	2034322	639881	-13.5	-11.4
150	2034328	639897	-13.5	-11.4
155	2034333	639912	-13.7	-11.6
160	2034339	639927	-13.8	-11.7
165	2034345	639943	-14.3	-12.2
170	2034351	639958	-14.5	-12.4
175	2034357	639973	-14.5	-12.4
180	2034362	639989	-14.3	-12.2
185	2034368	640004	-14.1	-12.0
190	2034374	640019	-14.3	-12.2
195	2034380	640035	-14.8	-12.7
200	2034386	640050	-14.9	-12.8
205	2034392	640065	-14.5	-12.4
210	2034397	640081	-14.5	-12.4
215	2034403	640096	-14.5	-12.4
220	2034409	640111	-14.7	-12.6
225	2034415	640127	-15.0	-12.9
230	2034421	640142	-15.5	-13.4
235	2034427	640157	-15.7	-13.6
240	2034432	640173	-16.2	-14.1
245	2034438	640188	-15.5	-13.4
250	2034444	640203	-15.9	-13.8
255	2034450	640219	-16.5	-14.4
260	2034456	640234	-16.8	-14.7

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
265	2034461	640249	-16.5	-14.4
270	2034467	640265	-16.0	-13.9
275	2034473	640280	-16.7	-14.6
280	2034479	640295	-16.7	-14.6
285	2034485	640311	-15.5	-13.4
290	2034491	640326	-15.5	-13.4
295	2034496	640341	-16.5	-14.4
300	2034502	640357	-16.5	-14.4
305	2034508	640372	-17.0	-14.9
310	2034514	640387	-17.0	-14.9
315	2034520	640403	-16.7	-14.6
320	2034525	640418	-17.1	-15.0
325	2034531	640433	-18.0	-15.9
330	2034537	640449	-18.3	-16.2
335	2034543	640464	-17.5	-15.4
340	2034549	640479	-17.5	-15.4
345	2034555	640495	-17.8	-15.7
350	2034560	640510	-17.5	-15.4
355	2034566	640525	-18.5	-16.4
360	2034572	640541	-18.5	-16.4
365	2034578	640556	-17.5	-15.4
370	2034584	640571	-18.5	-16.4
375	2034589	640587	-17.7	-15.6
380	2034595	640602	-18.5	-16.4
385	2034601	640617	-18.7	-16.6
390	2034607	640633	-19.0	-16.9
395	2034613	640648	-19.0	-16.9
400	2034619	640664	-19.5	-17.4
405	2034624	640679	-19.5	-17.4
410	2034630	640694	-20.0	-17.9
415	2034636	640710	-20.0	-17.9
420	2034642	640725	-19.5	-17.4
425	2034648	640740	-19.0	-16.9
430	2034653	640756	-18.7	-16.6
435	2034659	640771	-19.5	-17.4
440	2034665	640786	-19.5	-17.4
445	2034671	640802	-19.5	-17.4
450	2034677	640817	-19.5	-17.4
455	2034683	640832	-18.5	-16.4
460	2034688	640848	-19.0	-16.9
465	2034694	640863	-18.5	-16.4
470	2034700	640878	-18.9	-16.8
475	2034706	640894	-19.5	-17.4
480	2034712	640909	-19.5	-17.4
485	2034717	640924	-20.3	-18.2
490	2034723	640940	-20.0	-17.9
495	2034729	640955	-19.8	-17.7
500	2034735	640970	-20.0	-17.9
505	2034741	640986	-20.0	-17.9
510	2034747	641001	-20.5	-18.4
515	2034752	641016	-20.5	-18.4
520	2034758	641032	-21.5	-19.4
525	2034764	641047	-22.5	-20.4



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N6017

June 15, 1994

Start/End Time: 1329/1340 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2007.756

Low Water Datum [LWD] Correction feet -2.76

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Pole Prism Data

2033963.891	639502.855	8.318	10.3785
2033968.305	639513.207	8.085	10.1455
2033968.563	639513.394	9.423	11.4835
2033968.720	639514.146	9.422	11.4825
2033968.788	639514.335	7.383	9.4435
2033975.845	639529.474	7.877	9.9375
2033978.802	639539.174	0.742	2.8025
2033979.023	639544.615	-1.980	0.0805

Fathometer Data

12	2033983	639551	-3.3	-1.2
15	2033986	639560	-5.3	-3.2
20	2033992	639576	-6.9	-4.8
25	2033998	639591	-7.2	-5.1
30	2034003	639606	-7.5	-5.4
35	2034009	639622	-7.8	-5.7
40	2034015	639637	-8.1	-6.0
45	2034021	639652	-8.5	-6.4
50	2034027	639668	-8.8	-6.7
55	2034033	639683	-9.3	-7.2
60	2034038	639698	-9.9	-7.8
65	2034044	639714	-10.5	-8.4
70	2034050	639729	-11.3	-9.2
75	2034056	639744	-11.5	-9.4
80	2034062	639760	-11.6	-9.5
85	2034067	639775	-11.4	-9.3
90	2034073	639790	-12.3	-10.2
95	2034079	639806	-12.1	-10.0
100	2034085	639821	-12.3	-10.2
105	2034091	639836	-12.6	-10.5
110	2034097	639852	-12.3	-10.2
115	2034102	639867	-12.8	-10.7
120	2034108	639882	-13.1	-11.0
125	2034114	639898	-13.3	-11.2
130	2034120	639913	-13.3	-11.2
135	2034126	639928	-13.1	-11.0
140	2034132	639944	-12.8	-10.7
145	2034137	639959	-12.3	-10.2
150	2034143	639974	-12.3	-10.2
155	2034149	639990	-12.6	-10.5
160	2034155	640005	-12.8	-10.7
165	2034161	640020	-13.3	-11.2
170	2034166	640036	-13.8	-11.7
175	2034172	640051	-14.3	-12.2
180	2034178	640066	-14.7	-12.6
185	2034184	640082	-14.3	-12.2
190	2034190	640097	-14.6	-12.5
195	2034196	640112	-14.5	-12.4
200	2034201	640128	-14.8	-12.7
205	2034207	640143	-14.3	-12.2
210	2034213	640158	-14.3	-12.2
215	2034219	640174	-14.3	-12.2
220	2034225	640189	-14.6	-12.5
225	2034230	640204	-15.1	-13.0
230	2034236	640220	-15.3	-13.2
235	2034242	640235	-15.6	-13.5
240	2034248	640250	-14.8	-12.7
245	2034254	640266	-14.8	-12.7
250	2034260	640281	-15.3	-13.2
255	2034265	640296	-15.3	-13.2
260	2034271	640312	-15.8	-13.7
265	2034277	640327	-16.6	-14.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
270	2034283	640342	-16.8	-14.7
275	2034289	640358	-16.6	-14.5
280	2034294	640373	-17.1	-15.0
285	2034300	640388	-17.3	-15.2
290	2034306	640404	-17.8	-15.7
295	2034312	640419	-17.3	-15.2
300	2034318	640434	-17.3	-15.2
305	2034324	640450	-17.8	-15.7
310	2034329	640465	-17.8	-15.7
315	2034335	640480	-17.3	-15.2
320	2034341	640496	-17.3	-15.2
325	2034347	640511	-16.3	-14.2
330	2034353	640526	-16.3	-14.2
335	2034358	640542	-17.5	-15.4
340	2034364	640557	-16.5	-14.4
345	2034370	640572	-16.8	-14.7
350	2034376	640588	-16.8	-14.7
355	2034382	640603	-17.3	-15.2
360	2034388	640618	-18.3	-16.2
365	2034393	640634	-19.1	-17.0
370	2034399	640649	-18.8	-16.7
375	2034405	640665	-19.3	-17.2
380	2034411	640680	-19.7	-17.6
385	2034417	640695	-19.3	-17.2
390	2034422	640711	-19.8	-17.7
395	2034428	640726	-20.1	-18.0
400	2034434	640741	-20.1	-18.0
405	2034440	640757	-19.3	-17.2
410	2034446	640772	-19.3	-17.2
415	2034452	640787	-20.3	-18.2
420	2034457	640803	-19.3	-17.2
425	2034463	640818	-19.3	-17.2
430	2034469	640833	-20.1	-18.0
435	2034475	640849	-20.1	-18.0
440	2034481	640864	-19.3	-17.2
445	2034486	640879	-19.3	-17.2
450	2034492	640895	-20.1	-18.0
455	2034498	640910	-20.3	-18.2
460	2034504	640925	-19.3	-17.2
465	2034510	640941	-20.3	-18.2
470	2034516	640956	-19.3	-17.2
475	2034521	640971	-19.8	-17.7
480	2034527	640987	-20.1	-18.0
485	2034533	641002	-19.8	-17.7
490	2034539	641017	-19.8	-17.7
495	2034545	641033	-19.7	-17.6
500	2034550	641048	-19.8	-17.7
505	2034556	641063	-20.1	-18.0
510	2034562	641079	-20.3	-18.2
515	2034568	641094	-19.3	-17.2
520	2034574	641109	-19.8	-17.7
525	2034580	641125	-20.8	-18.7
530	2034585	641140	-21.3	-19.2
535	2034591	641155	-21.3	-19.2



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N5817

June 15, 1994

Start/End Time: 1030/1040 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2015.128

Low Water Datum [LWD] Correction feet -2.53

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Pole Prism Data

2033780.147	639580.414	8.297	10.3575
2033783.840	639591.066	8.094	10.1545
2033784.115	639591.157	9.425	11.4855
2033784.387	639591.970	9.431	11.4915
2033784.293	639592.149	7.402	9.4625
2033788.678	639602.802	8.630	10.6905
2033793.144	639614.753	0.982	3.0425
2033797.300	639619.599	-1.318	0.7425

Fathometer Data

12	2033798	639629	-0.8	1.2
15	2033802	639638	-2.5	-0.5
20	2033807	639653	-6.5	-4.5
25	2033813	639669	-7.5	-5.5
30	2033819	639684	-8.1	-6.1
35	2033825	639699	-8.5	-6.5
40	2033831	639715	-8.7	-6.7
45	2033837	639730	-9.5	-7.5
50	2033842	639745	-10.4	-8.4
55	2033848	639761	-10.7	-8.7
60	2033854	639776	-10.9	-8.9
65	2033860	639791	-11.1	-9.1
70	2033866	639807	-11.1	-9.1
75	2033871	639822	-11.2	-9.2
80	2033877	639837	-11.5	-9.5
85	2033883	639853	-11.5	-9.5
90	2033889	639868	-11.7	-9.7
95	2033895	639883	-12.2	-10.2
100	2033901	639899	-12.5	-10.5
105	2033906	639914	-12.7	-10.7
110	2033912	639929	-13.0	-11.0
115	2033918	639945	-13.1	-11.1
120	2033924	639960	-13.2	-11.2
125	2033930	639975	-13.4	-11.4
130	2033935	639991	-13.5	-11.5
135	2033941	640006	-13.2	-11.2
140	2033947	640021	-13.0	-11.0
145	2033953	640037	-13.5	-11.5
150	2033959	640052	-13.8	-11.8
155	2033965	640068	-13.5	-11.5
160	2033970	640083	-14.3	-12.3
165	2033976	640098	-14.3	-12.3
170	2033982	640114	-14.3	-12.3
175	2033988	640129	-13.5	-11.5
180	2033994	640144	-13.5	-11.5
185	2034000	640160	-14.2	-12.2
190	2034005	640175	-14.2	-12.2
195	2034011	640190	-15.0	-13.0
200	2034017	640206	-14.7	-12.7
205	2034023	640221	-14.7	-12.7
210	2034029	640236	-14.5	-12.5
215	2034034	640252	-15.3	-13.3
220	2034040	640267	-14.5	-12.5
225	2034046	640282	-14.8	-12.8
230	2034052	640298	-14.8	-12.8
235	2034058	640313	-15.5	-13.5
240	2034064	640328	-15.5	-13.5
245	2034069	640344	-14.5	-12.5
250	2034075	640359	-14.5	-12.5
255	2034081	640374	-15.0	-13.0
260	2034087	640390	-15.5	-13.5
265	2034093	640405	-17.3	-15.3

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
270	2034098	640420	-17.5	-15.5
275	2034104	640436	-17.9	-15.9
280	2034110	640451	-17.9	-15.9
285	2034116	640466	-17.5	-15.5
290	2034122	640482	-17.0	-15.0
295	2034128	640497	-17.0	-15.0
300	2034133	640512	-17.5	-15.5
305	2034139	640528	-18.3	-16.3
310	2034145	640543	-17.5	-15.5
315	2034151	640558	-18.0	-16.0
320	2034157	640574	-17.5	-15.5
325	2034162	640589	-18.5	-16.5
330	2034168	640604	-18.5	-16.5
335	2034174	640620	-18.0	-16.0
340	2034180	640635	-18.3	-16.3
345	2034186	640650	-17.7	-15.7
350	2034192	640666	-16.7	-14.7
355	2034197	640681	-17.3	-15.3
360	2034203	640696	-17.5	-15.5
365	2034209	640712	-19.0	-17.0
370	2034215	640727	-17.5	-15.5
375	2034221	640742	-18.0	-16.0
380	2034226	640758	-17.9	-15.9
385	2034232	640773	-17.9	-15.9
390	2034238	640788	-18.5	-16.5
395	2034244	640804	-18.5	-16.5
400	2034250	640819	-19.3	-17.3
405	2034256	640834	-18.9	-16.9
410	2034261	640850	-19.0	-17.0
415	2034267	640865	-19.1	-17.1
420	2034273	640880	-19.5	-17.5
425	2034279	640896	-19.7	-17.7
430	2034285	640911	-20.5	-18.5
435	2034290	640926	-19.5	-17.5
440	2034296	640942	-19.5	-17.5
445	2034302	640957	-19.9	-17.9
450	2034308	640972	-20.5	-18.5
455	2034314	640988	-20.5	-18.5
460	2034320	641003	-19.7	-17.7
465	2034325	641018	-20.0	-18.0
470	2034331	641034	-19.6	-17.6
475	2034337	641049	-19.3	-17.3
480	2034343	641064	-19.3	-17.3
485	2034349	641080	-19.5	-17.5
490	2034354	641095	-19.7	-17.7
495	2034360	641110	-20.1	-18.1
500	2034366	641126	-20.5	-18.5
505	2034372	641141	-21.0	-19.0
510	2034378	641156	-20.7	-18.7
515	2034384	641172	-19.5	-17.5
520	2034389	641187	-19.5	-17.5
525	2034395	641202	-20.5	-18.5
530	2034401	641218	-21.5	-19.5
535	2034407	641233	-20.5	-18.5
540	2034413	641248	-21.1	-19.1
545	2034418	641264	-21.5	-19.5
550	2034424	641279	-22.0	-20.0





1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N5617

June 15, 1994

Start/End Time: 1014/1023 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 2022.281  
Low Water Datum [LWD] Correction feet -2.52

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2033595.418	639658.026	8.267	10.3275
2033599.386	639668.708	8.129	10.1895
2033599.710	639668.979	9.447	11.5075
2033599.870	639669.630	9.444	11.5045
2033599.931	639669.745	7.476	9.5365
2033604.120	639680.153	8.556	10.6165
2033606.462	639686.360	3.334	5.3945
2033609.143	639690.847	0.485	2.5455
2033609.775	639695.485	-2.154	-0.0935

Fathometer Data

10	2033611	639700	-2.5	-0.5
15	2033617	639716	-6.0	-4.0
20	2033623	639731	-8.0	-6.0
25	2033629	639746	-8.5	-6.5
30	2033635	639762	-9.0	-7.0
35	2033640	639777	-9.3	-7.3
40	2033646	639792	-9.5	-7.5
45	2033652	639808	-10.0	-8.0
50	2033658	639823	-10.5	-8.5
55	2033664	639838	-11.0	-9.0
60	2033670	639854	-10.8	-8.8
65	2033675	639869	-11.5	-9.5
70	2033681	639884	-11.5	-9.5
75	2033687	639900	-11.9	-9.9
80	2033693	639915	-11.7	-9.7
85	2033699	639930	-12.0	-10.0
90	2033704	639946	-12.2	-10.2
95	2033710	639961	-11.6	-9.6
100	2033716	639976	-12.5	-10.5
105	2033722	639992	-12.5	-10.5
110	2033728	640007	-12.7	-10.7
115	2033734	640022	-12.5	-10.5
120	2033739	640038	-12.3	-10.3
125	2033745	640053	-12.8	-10.8
130	2033751	640068	-12.5	-10.5
135	2033757	640084	-12.5	-10.5
140	2033763	640099	-12.9	-10.9
145	2033768	640114	-14.3	-12.3
150	2033774	640130	-14.0	-12.0
155	2033780	640145	-13.3	-11.3
160	2033786	640160	-13.5	-11.5
165	2033792	640176	-13.5	-11.5
170	2033798	640191	-13.6	-11.6
175	2033803	640206	-13.5	-11.5
180	2033809	640222	-13.7	-11.7
185	2033815	640237	-13.7	-11.7
190	2033821	640253	-13.9	-11.9
195	2033827	640268	-13.9	-11.9
200	2033833	640283	-14.0	-12.0
205	2033838	640299	-14.5	-12.5
210	2033844	640314	-14.6	-12.6
215	2033850	640329	-14.5	-12.5
220	2033856	640345	-14.3	-12.3
225	2033862	640360	-14.5	-12.5
230	2033867	640375	-14.5	-12.5
235	2033873	640391	-14.5	-12.5
240	2033879	640406	-14.7	-12.7
245	2033885	640421	-15.5	-13.5
250	2033891	640437	-15.5	-13.5
255	2033897	640452	-16.5	-14.5
260	2033902	640467	-16.5	-14.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
265	2033908	640483	-16.7	-14.7
270	2033914	640498	-17.2	-15.2
275	2033920	640513	-16.5	-14.5
280	2033926	640529	-17.5	-15.5
285	2033931	640544	-17.5	-15.5
290	2033937	640559	-17.3	-15.3
295	2033943	640575	-17.5	-15.5
300	2033949	640590	-17.9	-15.9
305	2033955	640605	-17.9	-15.9
310	2033961	640621	-18.0	-16.0
315	2033966	640636	-17.5	-15.5
320	2033972	640651	-18.5	-16.5
325	2033978	640667	-18.5	-16.5
330	2033984	640682	-18.5	-16.5
335	2033990	640697	-18.8	-16.8
340	2033995	640713	-18.9	-16.9
345	2034001	640728	-18.5	-16.5
350	2034007	640743	-18.9	-16.9
355	2034013	640759	-19.5	-17.5
360	2034019	640774	-18.5	-16.5
365	2034025	640789	-19.5	-17.5
370	2034030	640805	-19.5	-17.5
375	2034036	640820	-19.3	-17.3
380	2034042	640835	-18.0	-16.0
385	2034048	640851	-19.0	-17.0
390	2034054	640866	-19.5	-17.5
395	2034059	640881	-19.7	-17.7
400	2034065	640897	-20.5	-18.5
405	2034071	640912	-19.5	-17.5
410	2034077	640927	-19.5	-17.5
415	2034083	640943	-19.5	-17.5
420	2034089	640958	-19.5	-17.5
425	2034094	640973	-19.6	-17.6
430	2034100	640989	-20.0	-18.0
435	2034106	641004	-19.3	-17.3
440	2034112	641019	-20.0	-18.0
445	2034118	641035	-19.5	-17.5
450	2034123	641050	-19.5	-17.5
455	2034129	641065	-19.3	-17.3
460	2034135	641081	-19.5	-17.5
465	2034141	641096	-20.5	-18.5
470	2034147	641111	-19.5	-17.5
475	2034153	641127	-20.5	-18.5
480	2034158	641142	-20.0	-18.0
485	2034164	641157	-19.7	-17.7
490	2034170	641173	-18.5	-16.5
495	2034176	641188	-19.5	-17.5
500	2034182	641203	-20.5	-18.5
505	2034187	641219	-20.5	-18.5
510	2034193	641234	-20.5	-18.5
515	2034199	641249	-20.8	-18.8
520	2034205	641265	-21.5	-19.5
525	2034211	641280	-21.5	-19.5
530	2034217	641295	-21.2	-19.2
535	2034222	641311	-21.7	-19.7
540	2034228	641326	-21.9	-19.9
545	2034234	641341	-22.0	-20.0



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N5417

June 15, 1994

Start/End Time: 942/952 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 1819.126

Low Water Datum [LWD] Correction feet -2.48

MR Dist.	Northing (ft)	Easting (ft)	Elev. (ft)	Depth (ft)
(m)	[IL SPC]	[IL SPC]	[LFD]	[LWD]

Prism Pole Data

2033335.477	639522.845	9.498	11.5585
2033340.432	639550.780	9.159	11.2195
2033344.152	639560.792	8.988	11.0485
2033344.323	639561.724	5.454	7.5145
2033346.838	639574.317	2.313	4.3735
2033348.522	639584.475	0.595	2.6555
2033351.816	639585.665	0.524	2.5845
2033359.202	639606.258	-1.455	0.6055
2033366.574	639626.720	-2.675	-0.6145
2033372.317	639648.431	-4.141	-2.0805
2033383.621	639667.301	-4.439	-2.3785

Fathometer Data

19	2033363	639609	-1.1	1.0
20	2033364	639612	-1.3	0.8
25	2033370	639627	-2.3	-0.2
30	2033376	639643	-3.3	-1.2
35	2033381	639658	-4.1	-2.0
40	2033387	639673	-4.6	-2.5
45	2033393	639689	-5.2	-3.1
50	2033399	639704	-5.6	-3.5
55	2033405	639719	-6.6	-4.5
60	2033411	639735	-7.3	-5.2
65	2033416	639750	-7.6	-5.5
70	2033422	639765	-8.1	-6.0
75	2033428	639781	-8.1	-6.0
80	2033434	639796	-8.6	-6.5
85	2033440	639811	-8.8	-6.7
90	2033445	639827	-9.4	-7.3
95	2033451	639842	-9.6	-7.5
100	2033457	639857	-10.1	-8.0
105	2033463	639873	-10.4	-8.3
110	2033469	639888	-10.6	-8.5
115	2033475	639903	-10.6	-8.5
120	2033480	639919	-10.8	-8.7
125	2033486	639934	-11.3	-9.2
130	2033492	639949	-11.7	-9.6
135	2033498	639965	-11.7	-9.6
140	2033504	639980	-12.1	-10.0
145	2033509	639995	-11.9	-9.8
150	2033515	640011	-12.1	-10.0
155	2033521	640026	-11.8	-9.7
160	2033527	640041	-11.6	-9.5
165	2033533	640057	-12.1	-10.0
170	2033539	640072	-12.4	-10.3
175	2033544	640087	-12.6	-10.5
180	2033550	640103	-12.6	-10.5
185	2033556	640118	-12.6	-10.5
190	2033562	640134	-12.9	-10.8
195	2033568	640149	-13.1	-11.0
200	2033573	640164	-13.1	-11.0
205	2033579	640180	-13.4	-11.3
210	2033585	640195	-13.7	-11.6
215	2033591	640210	-13.4	-11.3
220	2033597	640226	-13.1	-11.0
225	2033603	640241	-13.6	-11.5
230	2033608	640256	-13.6	-11.5
235	2033614	640272	-13.7	-11.6
240	2033620	640287	-14.1	-12.0
245	2033626	640302	-14.1	-12.0
250	2033632	640318	-14.1	-12.0
255	2033637	640333	-14.0	-11.9

MR Dist.	Northing (ft)	Easting (ft)	Elev. (ft)	Depth (ft)
(m)	[IL SPC]	[IL SPC]	[LFD]	[LWD]
260	2033643	640348	-14.6	-12.5
265	2033649	640364	-14.6	-12.5
270	2033655	640379	-14.8	-12.7
275	2033661	640394	-14.8	-12.7
280	2033667	640410	-15.0	-12.9
285	2033672	640425	-15.5	-13.4
290	2033678	640440	-15.4	-13.3
295	2033684	640456	-15.6	-13.5
300	2033690	640471	-15.6	-13.5
305	2033696	640486	-15.8	-13.7
310	2033701	640502	-16.1	-14.0
315	2033707	640517	-16.1	-14.0
320	2033713	640532	-15.6	-13.5
325	2033719	640548	-16.4	-14.3
330	2033725	640563	-17.4	-15.3
335	2033731	640578	-16.8	-14.7
340	2033736	640594	-17.1	-15.0
345	2033742	640609	-17.6	-15.5
350	2033748	640624	-17.6	-15.5
355	2033754	640640	-17.6	-15.5
360	2033760	640655	-17.6	-15.5
365	2033765	640670	-18.1	-16.0
370	2033771	640686	-17.6	-15.5
375	2033777	640701	-17.1	-15.0
380	2033783	640716	-17.4	-15.3
385	2033789	640732	-18.4	-16.3
390	2033795	640747	-18.8	-16.7
395	2033800	640762	-19.0	-16.9
400	2033806	640778	-19.6	-17.5
405	2033812	640793	-19.6	-17.5
410	2033818	640808	-19.4	-17.3
415	2033824	640824	-19.6	-17.5
420	2033829	640839	-19.6	-17.5
425	2033835	640854	-19.3	-17.2
430	2033841	640870	-19.8	-17.7
435	2033847	640885	-19.6	-17.5
440	2033853	640900	-19.7	-17.6
445	2033859	640916	-19.7	-17.6
450	2033864	640931	-20.1	-18.0
455	2033870	640946	-20.6	-18.5
460	2033876	640962	-20.2	-18.1
465	2033882	640977	-19.9	-17.8
470	2033888	640992	-20.2	-18.1
475	2033894	641008	-19.6	-17.5
480	2033899	641023	-20.0	-17.9
485	2033905	641038	-20.1	-18.0
490	2033911	641054	-20.6	-18.5
495	2033917	641069	-20.0	-17.9
500	2033923	641084	-20.6	-18.5
505	2033928	641100	-19.8	-17.7
510	2033934	641115	-20.7	-18.6
515	2033940	641130	-19.5	-17.4
520	2033946	641146	-19.9	-17.8
525	2033952	641161	-19.6	-17.5
530	2033958	641176	-19.1	-17.0
535	2033963	641192	-19.6	-17.5
540	2033969	641207	-20.5	-18.4
545	2033975	641222	-19.6	-17.5
550	2033981	641238	-20.1	-18.0
555	2033987	641253	-20.5	-18.4
560	2033992	641268	-21.6	-19.5
565	2033998	641284	-22.1	-20.0
570	2034004	641299	-21.6	-19.5
575	2034010	641314	-21.6	-19.5
580	2034016	641330	-22.1	-20.0
585	2034022	641345	-22.4	-20.3
590	2034027	641360	-22.4	-20.3
595	2034033	641376	-21.6	-19.5
600	2034039	641391	-21.6	-19.5
605	2034045	641407	-22.1	-20.0



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N5267

June 15, 1994

Start/End Time: 915/924 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 1792.759

Low Water Datum [LWD] Correction feet -2.45

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2033187.737	639567.204	9.602	11.6625
2033188.818	639573.195	9.281	11.3415
2033191.086	639579.244	8.634	10.6945
2033192.859	639586.216	7.559	9.6195
2033193.700	639587.347	-0.187	1.8735
2033195.320	639591.410	0.808	2.8685
2033198.017	639601.747	-0.943	1.1175
2033199.607	639608.744	-2.830	-0.7695
2033201.895	639618.693	-3.628	-1.5675
2033203.982	639630.485	-4.657	-2.5965
2033204.316	639638.702	-4.946	-2.8855

Fathometer Data

8	2033200	639604	-1.1	0.9
10	2033203	639610	-3.0	-1.0
15	2033209	639625	-3.8	-1.8
20	2033214	639641	-4.6	-2.6
25	2033220	639656	-5.0	-3.0
30	2033226	639671	-5.1	-3.1
35	2033232	639687	-5.1	-3.1
40	2033238	639702	-5.6	-3.6
45	2033243	639717	-5.8	-3.8
50	2033249	639733	-5.8	-3.8
55	2033255	639748	-6.0	-4.0
60	2033261	639763	-6.6	-4.6
65	2033267	639779	-7.0	-5.0
70	2033273	639794	-7.6	-5.6
75	2033278	639809	-7.9	-5.9
80	2033284	639825	-8.4	-6.4
85	2033290	639840	-8.6	-6.6
90	2033296	639855	-8.8	-6.8
95	2033302	639871	-8.8	-6.8
100	2033307	639886	-9.6	-7.6
105	2033313	639901	-10.0	-8.0
110	2033319	639917	-10.6	-8.6
115	2033325	639932	-10.6	-8.6
120	2033331	639947	-10.9	-8.9
125	2033337	639963	-11.2	-9.2
130	2033342	639978	-11.5	-9.5
135	2033348	639993	-11.6	-9.6
140	2033354	640009	-12.1	-10.1
145	2033360	640024	-12.4	-10.4
150	2033366	640039	-12.4	-10.4
155	2033371	640055	-12.6	-10.6
160	2033377	640070	-12.6	-10.6
165	2033383	640085	-12.6	-10.6
170	2033389	640101	-12.8	-10.8
175	2033395	640116	-12.6	-10.6
180	2033401	640131	-12.4	-10.4
185	2033406	640147	-12.6	-10.6
190	2033412	640162	-12.8	-10.8
195	2033418	640177	-13.0	-11.0
200	2033424	640193	-13.1	-11.1
205	2033430	640208	-12.8	-10.8
210	2033435	640223	-13.2	-11.2
215	2033441	640239	-13.1	-11.1
220	2033447	640254	-13.6	-11.6
225	2033453	640269	-13.6	-11.6
230	2033459	640285	-14.0	-12.0
235	2033465	640300	-14.1	-12.1
240	2033470	640315	-13.8	-11.8
245	2033476	640331	-14.2	-12.2

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
250	2033482	640346	-14.4	-12.4
255	2033488	640361	-14.5	-12.5
260	2033494	640377	-14.1	-12.1
265	2033499	640392	-14.6	-12.6
270	2033505	640407	-15.1	-13.1
275	2033511	640423	-15.1	-13.1
280	2033517	640438	-15.4	-13.4
285	2033523	640453	-15.6	-13.6
290	2033529	640469	-15.8	-13.8
295	2033534	640484	-15.6	-13.6
300	2033540	640499	-15.6	-13.6
305	2033546	640515	-15.6	-13.6
310	2033552	640530	-15.6	-13.6
315	2033558	640545	-14.6	-12.6
320	2033564	640561	-14.8	-12.8
325	2033569	640576	-15.6	-13.6
330	2033575	640592	-15.6	-13.6
335	2033581	640607	-15.9	-13.9
340	2033587	640622	-16.6	-14.6
345	2033593	640638	-17.4	-15.4
350	2033598	640653	-17.6	-15.6
355	2033604	640668	-17.3	-15.3
360	2033610	640684	-17.6	-15.6
365	2033616	640699	-17.4	-15.4
370	2033622	640714	-18.4	-16.4
375	2033628	640730	-18.6	-16.6
380	2033633	640745	-19.4	-17.4
385	2033639	640760	-18.6	-16.6
390	2033645	640776	-18.6	-16.6
395	2033651	640791	-18.9	-16.9
400	2033657	640806	-19.6	-17.6
405	2033662	640822	-19.2	-17.2
410	2033668	640837	-19.6	-17.6
415	2033674	640852	-19.7	-17.7
420	2033680	640868	-19.6	-17.6
425	2033686	640883	-19.7	-17.7
430	2033692	640898	-20.1	-18.1
435	2033697	640914	-19.7	-17.7
440	2033703	640929	-19.3	-17.3
445	2033709	640944	-19.6	-17.6
450	2033715	640960	-19.6	-17.6
455	2033721	640975	-20.4	-18.4
460	2033726	640990	-20.2	-18.2
465	2033732	641006	-20.1	-18.1
470	2033738	641021	-20.6	-18.6
475	2033744	641036	-20.0	-18.0
480	2033750	641052	-20.1	-18.1
485	2033756	641067	-20.5	-18.5
490	2033761	641082	-20.6	-18.6
495	2033767	641098	-20.2	-18.2
500	2033773	641113	-20.4	-18.4
505	2033779	641128	-20.1	-18.1
510	2033785	641144	-20.1	-18.1
515	2033790	641159	-19.7	-17.7
520	2033796	641174	-19.8	-17.8
525	2033802	641190	-19.9	-17.9
530	2033808	641205	-20.3	-18.3
535	2033814	641220	-21.4	-19.4
540	2033820	641236	-21.4	-19.4
545	2033825	641251	-21.6	-19.6
550	2033831	641266	-21.8	-19.8
555	2033837	641282	-22.0	-20.0





1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N5067

June 15, 1994

Start/End Time: 836/845 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 1772.569

Low Water Datum [LWD] Correction feet -2.44

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2032992.565	639616.152	8.615	10.6755
2032994.395	639621.921	8.209	10.2695
2032995.946	639627.230	8.799	10.8595
2032996.672	639631.414	8.439	10.4995
2032999.904	639639.923	8.022	10.0825
2033000.534	639644.931	6.308	8.3685
2033000.576	639645.601	3.485	5.5455
2033003.962	639653.324	2.782	4.8425
2033006.648	639659.992	3.334	5.3945
2033009.578	639666.503	2.443	4.5035
2033012.437	639675.797	1.460	3.5205
2033014.463	639680.784	0.451	2.5115
2033016.469	639689.495	-0.881	1.1795
2033019.791	639699.252	-2.829	-0.7685
2033025.999	639711.977	-4.855	-2.7945
2033033.444	639730.007	-6.903	-4.8425
2033039.080	639742.040	-7.806	-5.7455
2033042.198	639749.743	-9.478	-7.4175

Fathometer Data

22	2033023	639699	-1.1	0.9
25	2033026	639708	-4.6	-2.6
30	2033032	639723	-6.1	-4.1
35	2033038	639739	-7.1	-5.1
40	2033043	639754	-7.6	-5.6
45	2033049	639769	-7.9	-5.9
50	2033055	639785	-7.5	-5.5
55	2033061	639800	-7.6	-5.6
60	2033067	639815	-7.8	-5.8
65	2033073	639831	-8.1	-6.1
70	2033078	639846	-8.0	-6.0
75	2033084	639861	-8.1	-6.1
80	2033090	639877	-8.1	-6.1
85	2033096	639892	-8.1	-6.1
90	2033102	639907	-8.1	-6.1
95	2033107	639923	-8.1	-6.1
100	2033113	639938	-8.2	-6.2
105	2033119	639953	-8.4	-6.4
110	2033125	639969	-8.7	-6.7
115	2033131	639984	-9.1	-7.1
120	2033137	639999	-9.2	-7.2
125	2033142	640015	-9.3	-7.3
130	2033148	640030	-9.5	-7.5
135	2033154	640045	-9.6	-7.6
140	2033160	640061	-10.1	-8.1
145	2033166	640076	-10.6	-8.6
150	2033171	640091	-10.7	-8.7
155	2033177	640107	-10.9	-8.9
160	2033183	640122	-11.6	-9.6
165	2033189	640137	-12.1	-10.1
170	2033195	640153	-11.8	-9.8
175	2033201	640168	-12.3	-10.3
180	2033206	640183	-12.6	-10.6
185	2033212	640199	-12.6	-10.6
190	2033218	640214	-12.4	-10.4
195	2033224	640229	-12.6	-10.6
200	2033230	640245	-12.8	-10.8
205	2033236	640260	-12.9	-10.9
210	2033241	640275	-12.7	-10.7
215	2033247	640291	-13.2	-11.2
220	2033253	640306	-13.2	-11.2
225	2033259	640322	-13.6	-11.6

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
230	2033265	640337	-13.7	-11.7
235	2033270	640352	-13.8	-11.8
240	2033276	640368	-14.0	-12.0
245	2033282	640383	-14.2	-12.2
250	2033288	640398	-14.4	-12.4
255	2033294	640414	-14.0	-12.0
260	2033300	640429	-14.1	-12.1
265	2033305	640444	-13.9	-11.9
270	2033311	640460	-14.0	-12.0
275	2033317	640475	-14.4	-12.4
280	2033323	640490	-14.8	-12.8
285	2033329	640506	-14.6	-12.6
290	2033334	640521	-15.1	-13.1
295	2033340	640536	-15.2	-13.2
300	2033346	640552	-15.4	-13.4
305	2033352	640567	-15.4	-13.4
310	2033358	640582	-15.2	-13.2
315	2033364	640598	-15.8	-13.8
320	2033369	640613	-16.1	-14.1
325	2033375	640628	-16.6	-14.6
330	2033381	640644	-16.7	-14.7
335	2033387	640659	-16.6	-14.6
340	2033393	640674	-16.4	-14.4
345	2033398	640690	-16.4	-14.4
350	2033404	640705	-17.6	-15.6
355	2033410	640720	-17.8	-15.8
360	2033416	640736	-18.3	-16.3
365	2033422	640751	-17.3	-15.3
370	2033428	640766	-18.6	-16.6
375	2033433	640782	-18.6	-16.6
380	2033439	640797	-18.7	-16.7
385	2033445	640812	-18.6	-16.6
390	2033451	640828	-18.9	-16.9
395	2033457	640843	-19.1	-17.1
400	2033462	640858	-18.8	-16.8
405	2033468	640874	-19.4	-17.4
410	2033474	640889	-19.6	-17.6
415	2033480	640904	-19.7	-17.7
420	2033486	640920	-19.6	-17.6
425	2033492	640935	-20.6	-18.6
430	2033497	640950	-19.6	-17.6
435	2033503	640966	-19.6	-17.6
440	2033509	640981	-19.6	-17.6
445	2033515	640996	-19.4	-17.4
450	2033521	641012	-19.1	-17.1
455	2033526	641027	-19.6	-17.6
460	2033532	641042	-19.6	-17.6
465	2033538	641058	-19.9	-17.9
470	2033544	641073	-19.8	-17.8
475	2033550	641088	-19.6	-17.6
480	2033556	641104	-19.3	-17.3
485	2033561	641119	-19.6	-17.6
490	2033567	641134	-19.1	-17.1
495	2033573	641150	-19.1	-17.1
500	2033579	641165	-19.6	-17.6
505	2033585	641180	-20.1	-18.1
510	2033590	641196	-20.0	-18.0
515	2033596	641211	-19.8	-17.8
520	2033602	641226	-20.6	-18.6
525	2033608	641242	-20.9	-18.9
530	2033614	641257	-21.1	-19.1
535	2033620	641272	-21.5	-19.5
540	2033625	641288	-21.6	-19.6
545	2033631	641303	-21.4	-19.4
550	2033637	641318	-20.6	-18.6
555	2033643	641334	-21.4	-19.4
560	2033649	641349	-21.7	-19.7
565	2033655	641364	-21.1	-19.1
570	2033660	641380	-21.1	-19.1
575	2033666	641395	-20.6	-18.6
580	2033672	641410	-20.5	-18.5
585	2033678	641426	-20.7	-18.7
590	2033684	641441	-20.6	-18.6
595	2033689	641456	-21.6	-19.6
600	2033695	641472	-21.5	-19.5



1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N4867

June 15, 1994

Start/End Time: 856/905 CST

MiniRanger (MR) Easting

Lake Forest Coordinates [LFC] feet 1734.873

Low Water Datum [LWD] Correction feet -2.42

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
Prism Pole Data				
2032794.039	639660.478	7.714	9.7745	
2032795.369	639662.526	8.812	10.8725	
2032796.586	639667.013	8.556	10.6165	
2032798.334	639674.198	8.050	10.1105	
2032800.652	639681.328	7.295	9.3555	
2032802.202	639684.908	6.526	8.5865	
2032805.202	639691.331	5.478	7.5385	
2032810.094	639704.353	3.542	5.6025	
2032814.502	639719.885	1.941	4.0015	
2032819.423	639729.208	1.113	3.1735	
2032823.022	639735.823	0.372	2.4325	
2032829.238	639743.614	-1.306	0.7545	
2032826.599	639757.158	-3.020	-0.9595	
2032829.968	639768.616	-4.154	-2.0935	
2032832.730	639778.389	-5.049	-2.9885	

Fathometer Data

30	2032831	639759	-2.6	-0.6
35	2032837	639774	-4.1	-2.1
40	2032843	639790	-7.6	-5.6
45	2032849	639805	-8.1	-6.1
50	2032855	639820	-8.1	-6.1
55	2032861	639836	-8.1	-6.1
60	2032866	639851	-8.1	-6.1
65	2032872	639866	-8.6	-6.6
70	2032878	639882	-8.6	-6.6
75	2032884	639897	-9.0	-7.0
80	2032890	639912	-9.2	-7.2
85	2032895	639928	-9.2	-7.2
90	2032901	639943	-9.4	-7.4
95	2032907	639958	-9.4	-7.4
100	2032913	639974	-8.8	-6.8
105	2032919	639989	-8.8	-6.8
110	2032925	640004	-8.6	-6.6
115	2032930	640020	-8.8	-6.8
120	2032936	640035	-8.7	-6.7
125	2032942	640050	-9.2	-7.2
130	2032948	640066	-9.1	-7.1
135	2032954	640081	-9.4	-7.4
140	2032959	640096	-9.5	-7.5
145	2032965	640112	-9.6	-7.6
150	2032971	640127	-9.6	-7.6
155	2032977	640142	-9.8	-7.8
160	2032983	640158	-10.2	-8.2
165	2032989	640173	-10.5	-8.5
170	2032994	640188	-10.7	-8.7
175	2033000	640204	-11.6	-9.6
180	2033006	640219	-12.6	-10.6
185	2033012	640235	-12.9	-10.9
190	2033018	640250	-13.2	-11.2
195	2033024	640265	-13.1	-11.1
200	2033029	640281	-13.4	-11.4
205	2033035	640296	-13.6	-11.6
210	2033041	640311	-13.6	-11.6
215	2033047	640327	-13.6	-11.6
220	2033053	640342	-13.7	-11.7
225	2033058	640357	-13.9	-11.9
230	2033064	640373	-14.2	-12.2
235	2033070	640388	-14.1	-12.1
240	2033076	640403	-14.2	-12.2
245	2033082	640419	-14.6	-12.6
250	2033088	640434	-14.6	-12.6

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
255	2033093	640449	-14.1	-12.1
260	2033099	640465	-14.1	-12.1
265	2033105	640480	-14.4	-12.4
270	2033111	640495	-14.6	-12.6
275	2033117	640511	-14.6	-12.6
280	2033122	640526	-14.6	-12.6
285	2033128	640541	-14.6	-12.6
290	2033134	640557	-14.6	-12.6
295	2033140	640572	-14.6	-12.6
300	2033146	640587	-14.6	-12.6
305	2033152	640603	-14.6	-12.6
310	2033157	640618	-14.6	-12.6
315	2033163	640633	-14.8	-12.8
320	2033169	640649	-15.6	-13.6
325	2033175	640664	-15.6	-13.6
330	2033181	640679	-15.8	-13.8
335	2033186	640695	-15.8	-13.8
340	2033192	640710	-15.8	-13.8
345	2033198	640725	-16.2	-14.2
350	2033204	640741	-16.4	-14.4
355	2033210	640756	-16.4	-14.4
360	2033216	640771	-16.6	-14.6
365	2033221	640787	-17.1	-15.1
370	2033227	640802	-17.6	-15.6
375	2033233	640817	-17.6	-15.6
380	2033239	640833	-17.8	-15.8
385	2033245	640848	-18.1	-16.1
390	2033250	640863	-18.2	-16.2
395	2033256	640879	-18.1	-16.1
400	2033262	640894	-18.4	-16.4
405	2033268	640909	-18.4	-16.4
410	2033274	640925	-18.6	-16.6
415	2033280	640940	-18.7	-16.7
420	2033285	640955	-18.6	-16.6
425	2033291	640971	-18.6	-16.6
430	2033297	640986	-18.6	-16.6
435	2033303	641001	-18.6	-16.6
440	2033309	641017	-18.6	-16.6
445	2033314	641032	-19.1	-17.1
450	2033320	641047	-19.6	-17.6
455	2033326	641063	-19.6	-17.6
460	2033332	641078	-19.8	-17.8
465	2033338	641093	-19.6	-17.6
470	2033344	641109	-18.6	-16.6
475	2033349	641124	-19.1	-17.1
480	2033355	641139	-19.6	-17.6
485	2033361	641155	-19.5	-17.5
490	2033367	641170	-19.6	-17.6
495	2033373	641185	-19.4	-17.4
500	2033378	641201	-19.4	-17.4
505	2033384	641216	-19.7	-17.7
510	2033390	641231	-19.6	-17.6
515	2033396	641247	-20.1	-18.1
520	2033402	641262	-20.6	-18.6
525	2033408	641277	-20.6	-18.6
530	2033413	641293	-20.7	-18.7
535	2033419	641308	-20.6	-18.6
540	2033425	641323	-20.6	-18.6
545	2033431	641339	-20.6	-18.6
550	2033437	641354	-20.4	-18.4
555	2033442	641369	-19.8	-17.8
560	2033448	641385	-21.1	-19.1
565	2033454	641400	-21.1	-19.1
570	2033460	641415	-21.1	-19.1
575	2033466	641431	-21.1	-19.1
580	2033472	641446	-21.1	-19.1
585	2033477	641461	-21.1	-19.1
590	2033483	641477	-21.1	-19.1
595	2033489	641492	-20.8	-18.8
600	2033495	641508	-21.7	-19.7
605	2033501	641523	-21.6	-19.6
610	2033507	641538	-21.6	-19.6
615	2033512	641554	-21.7	-19.7
620	2033518	641569	-22.6	-20.6





1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N4667

June 14, 1994  
Start/End Time: 1138/1150 CST

MiniRanger (MR) Easting:  
Lake Forest Coordinates [LFC] feet 1844.921  
Low Water Datum [LWD] Correction feet -2.69

MR Dist. (m)	Northing [IL SPC] (ft)	Easting [IL SPC] (ft)	Elev. [LFD] (ft)	Depth [LWD] (ft)
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data				
2032593.313	639695.832	9.570	11.6305	
2032595.583	639701.208	7.299	9.3595	
2032596.350	639702.948	7.184	9.2445	
2032602.411	639718.440	6.545	8.6055	
2032609.548	639740.677	5.303	7.3635	
2032617.053	639756.008	4.572	6.6325	
2032628.091	639783.476	4.168	6.2285	
2032641.517	639820.705	2.075	4.1355	
2032643.454	639830.720	8.022	10.0825	
2032646.184	639834.911	8.063	10.1235	
2032647.735	639841.193	6.591	8.6515	
2032650.509	639848.129	5.517	7.5775	
2032651.300	639852.734	0.055	2.1155	
2032653.416	639859.038	-2.897	-0.8365	
2032655.979	639864.766	-4.196	-2.1355	
2032658.000	639870.123	-4.984	-2.9235	

Fathometer Data				
7	2032657	639862	-1.4	0.7
10	2032660	639872	-4.1	-2.0
15	2032666	639887	-5.7	-3.6
20	2032672	639902	-6.7	-4.6
25	2032678	639918	-7.4	-5.3
30	2032684	639933	-7.5	-5.4
35	2032689	639948	-8.1	-6.0
40	2032695	639964	-8.4	-6.3
45	2032701	639979	-8.7	-6.6
50	2032707	639994	-9.1	-7.0
55	2032713	640010	-9.4	-7.3
60	2032718	640025	-9.4	-7.3
65	2032724	640040	-9.2	-7.1
70	2032730	640056	-8.7	-6.6
75	2032736	640071	-8.6	-6.5
80	2032742	640086	-8.4	-6.3
85	2032748	640102	-8.4	-6.3
90	2032753	640117	-8.4	-6.3
95	2032759	640132	-8.6	-6.5
100	2032765	640148	-8.6	-6.5
105	2032771	640163	-8.9	-6.8
110	2032777	640178	-8.6	-6.5
115	2032782	640194	-9.2	-7.1
120	2032788	640209	-9.4	-7.3
125	2032794	640224	-9.4	-7.3
130	2032800	640240	-9.4	-7.3
135	2032806	640255	-9.9	-7.8
140	2032812	640270	-10.2	-8.1
145	2032817	640286	-10.4	-8.3
150	2032823	640301	-10.4	-8.3
155	2032829	640316	-10.4	-8.3
160	2032835	640332	-11.9	-9.8
165	2032841	640347	-11.4	-9.3
170	2032846	640362	-12.2	-10.1
175	2032852	640378	-12.4	-10.3
180	2032858	640393	-12.5	-10.4
185	2032864	640408	-13.0	-10.9
190	2032870	640424	-13.4	-11.3
195	2032876	640439	-12.9	-10.8
200	2032881	640454	-12.9	-10.8
205	2032887	640470	-13.2	-11.1
210	2032893	640485	-13.4	-11.3
215	2032899	640500	-13.9	-11.8
220	2032905	640516	-14.0	-11.9

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
225	2032910	640531	-13.9	-11.8
230	2032916	640546	-14.2	-12.1
235	2032922	640562	-13.9	-11.8
240	2032928	640577	-14.9	-12.8
245	2032934	640592	-14.0	-11.9
250	2032940	640608	-13.9	-11.8
255	2032945	640623	-14.0	-11.9
260	2032951	640638	-15.4	-13.3
265	2032957	640654	-14.4	-12.3
270	2032963	640669	-15.4	-13.3
275	2032969	640684	-15.4	-13.3
280	2032974	640700	-14.4	-12.3
285	2032980	640715	-14.9	-12.8
290	2032986	640730	-14.9	-12.8
295	2032992	640746	-14.9	-12.8
300	2032998	640761	-16.2	-14.1
305	2033004	640776	-15.5	-13.4
310	2033009	640792	-16.0	-13.9
315	2033015	640807	-16.4	-14.3
320	2033021	640822	-16.4	-14.3
325	2033027	640838	-16.4	-14.3
330	2033033	640853	-16.9	-14.8
335	2033038	640868	-16.4	-14.3
340	2033044	640884	-16.4	-14.3
345	2033050	640899	-16.4	-14.3
350	2033056	640914	-16.4	-14.3
355	2033062	640930	-16.9	-14.8
360	2033068	640945	-16.9	-14.8
365	2033073	640960	-17.2	-15.1
370	2033079	640976	-17.4	-15.3
375	2033085	640991	-17.9	-15.8
380	2033091	641007	-17.9	-15.8
385	2033097	641022	-18.2	-16.1
390	2033103	641037	-18.4	-16.3
395	2033108	641053	-18.4	-16.3
400	2033114	641068	-18.4	-16.3
405	2033120	641083	-18.9	-16.8
410	2033126	641099	-18.9	-16.8
415	2033132	641114	-19.0	-16.9
420	2033137	641129	-18.4	-16.3
425	2033143	641145	-19.0	-16.9
430	2033149	641160	-18.9	-16.8
435	2033155	641175	-18.2	-16.1
440	2033161	641191	-18.4	-16.3
445	2033167	641206	-18.4	-16.3
450	2033172	641221	-18.6	-16.5
455	2033178	641237	-19.9	-17.8
460	2033184	641252	-19.4	-17.3
465	2033190	641267	-19.2	-17.1
470	2033196	641283	-19.4	-17.3
475	2033201	641298	-19.4	-17.3
480	2033207	641313	-19.8	-17.7
485	2033213	641329	-20.2	-18.1
490	2033219	641344	-20.2	-18.1
495	2033225	641359	-20.2	-18.1
500	2033231	641375	-20.2	-18.1
505	2033236	641390	-19.4	-17.3
510	2033242	641405	-19.4	-17.3
515	2033248	641421	-20.2	-18.1
520	2033254	641436	-19.9	-17.8
525	2033260	641451	-19.9	-17.8
530	2033265	641467	-20.4	-18.3
535	2033271	641482	-20.4	-18.3
540	2033277	641497	-20.9	-18.8
545	2033283	641513	-21.4	-19.3
550	2033289	641528	-21.4	-19.3
555	2033295	641543	-21.4	-19.3
560	2033300	641559	-21.4	-19.3
565	2033306	641574	-21.4	-19.3
570	2033312	641589	-21.4	-19.3
575	2033318	641605	-21.6	-19.5
580	2033324	641620	-21.4	-19.3
585	2033329	641635	-21.4	-19.3
590	2033335	641651	-21.4	-19.3
595	2033341	641666	-21.9	-19.8





1994 FOREST PARK BEACH BATHYMETRIC DATA  
Illinois State Geological Survey

LINE N4467

June 15, 1994

Start/End Time: 1058/1110 CST

MiniRanger (MR) Easting:

Lake Forest Coordinates [LFC] feet 1678.546

Low Water Datum [LWD] Correction feet -2.54

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
--------------------	------------------------------	-----------------------------	------------------------	------------------------

Prism Pole Data

2032399.813	639750.726	12.063	14.1235
2032401.718	639753.122	10.260	12.3205
2032402.420	639756.202	9.871	11.9315
2032407.114	639768.951	9.696	11.7565
2032408.777	639774.333	9.197	11.2575
2032415.040	639789.400	5.518	7.5785
2032418.916	639801.337	5.302	7.3625
2032423.074	639812.085	4.679	6.7395
2032427.003	639822.451	4.248	6.3085
2032431.691	639834.796	3.333	5.3935
2032439.094	639851.952	1.025	3.0855
2032440.163	639857.767	-0.108	1.9525
2032442.392	639865.463	-1.578	0.4825
2032445.410	639873.661	-2.277	-0.2165
2032447.538	639879.018	-2.840	-0.7795
2032448.711	639882.739	1.276	3.3365
2032450.621	639889.599	2.081	4.1415
2032452.610	639895.587	3.799	5.8595
2032458.265	639909.342	-0.980	1.0805
2032461.269	639912.935	-5.765	-3.7045

Fathometer Data

53	2032464	639919	-4.7	-2.7
60	2032472	639940	-8.7	-6.7
65	2032478	639956	-8.3	-6.3
70	2032484	639971	-8.6	-6.6
75	2032490	639986	-9.1	-7.1
80	2032496	640002	-9.0	-7.0
85	2032502	640017	-9.7	-7.7
90	2032507	640032	-9.7	-7.7
95	2032513	640048	-10.1	-8.1
100	2032519	640063	-10.4	-8.4
105	2032525	640078	-10.5	-8.5
110	2032531	640094	-10.5	-8.5
115	2032536	640109	-10.0	-8.0
120	2032542	640124	-10.0	-8.0
125	2032548	640140	-10.5	-8.5
130	2032554	640155	-10.6	-8.6
135	2032560	640170	-9.9	-7.9
140	2032566	640186	-10.0	-8.0
145	2032571	640201	-9.7	-7.7
150	2032577	640216	-10.0	-8.0
155	2032583	640232	-10.0	-8.0
160	2032589	640247	-10.0	-8.0
165	2032595	640262	-10.0	-8.0
170	2032600	640278	-10.1	-8.1
175	2032606	640293	-10.0	-8.0
180	2032612	640308	-10.2	-8.2
185	2032618	640324	-10.5	-8.5
190	2032624	640339	-10.5	-8.5
195	2032630	640354	-10.5	-8.5
200	2032635	640370	-10.9	-8.9
205	2032641	640385	-10.8	-8.8
210	2032647	640400	-11.0	-9.0
215	2032653	640416	-11.5	-9.5
220	2032659	640431	-11.5	-9.5
225	2032664	640446	-12.5	-10.5
230	2032670	640462	-13.3	-11.3
235	2032676	640477	-13.5	-11.5
240	2032682	640492	-13.3	-11.3
245	2032688	640508	-12.5	-10.5
250	2032694	640523	-12.5	-10.5

MR Dist. (m)	Northing (ft) [IL SPC]	Easting (ft) [IL SPC]	Elev. (ft) [LFD]	Depth (ft) [LWD]
255	2032699	640538	-12.6	-10.6
260	2032705	640554	-13.5	-11.5
265	2032711	640569	-14.2	-12.2
270	2032717	640584	-14.5	-12.5
275	2032723	640600	-14.6	-12.6
280	2032728	640615	-14.5	-12.5
285	2032734	640630	-14.4	-12.4
290	2032740	640646	-14.7	-12.7
295	2032746	640661	-15.1	-13.1
300	2032752	640676	-15.3	-13.3
305	2032758	640692	-15.0	-13.0
310	2032763	640707	-15.3	-13.3
315	2032769	640723	-15.3	-13.3
320	2032775	640738	-15.5	-13.5
325	2032781	640753	-15.8	-13.8
330	2032787	640769	-15.9	-13.9
335	2032792	640784	-16.3	-14.3
340	2032798	640799	-16.5	-14.5
345	2032804	640815	-16.8	-14.8
350	2032810	640830	-17.0	-15.0
355	2032816	640845	-17.0	-15.0
360	2032822	640861	-16.7	-14.7
365	2032827	640876	-17.5	-15.5
370	2032833	640891	-17.5	-15.5
375	2032839	640907	-17.7	-15.7
380	2032845	640922	-17.5	-15.5
385	2032851	640937	-17.5	-15.5
390	2032856	640953	-18.0	-16.0
395	2032862	640968	-18.5	-16.5
400	2032868	640983	-17.5	-15.5
405	2032874	640999	-17.6	-15.6
410	2032880	641014	-18.1	-16.1
415	2032886	641029	-18.3	-16.3
420	2032891	641045	-18.0	-16.0
425	2032897	641060	-18.1	-16.1
430	2032903	641075	-18.5	-16.5



N4667



Plate 1. Nearshore Bathymetry  
And Beach Topography  
Forest Park Beach  
Lake Forest, Illinois

by  
Michael J. Chrzastowski and C. Brian Trask  
Data Collected by City of Lake Forest  
June, July, and August 1994  
and  
Illinois State Geological Survey  
June 1994



Map accompanies 1994 Final Report Entitled:  
REVIEW OF THE CITY OF LAKE FOREST FINAL REPORT  
FOR THE  
1994 BEACH AND NEARSHORE MONITORING PROGRAM  
FOREST PARK BEACH, LAKE FOREST, ILLINOIS  
Prepared for Illinois Department of Transportation -  
Division of Water Resources  
IDOT Project No. WR-09118/SRA-190

- Contours referenced to Lake Forest Datum (LFD)  
Contour interval, 1 foot
- Groins
- Forest Park
- Park Buildings
- Approximate extent of beach sand above  
Lake Forest Datum (LFD)
- City of Lake Forest data  
(All data collected with total station and prism pole)
  - Elevation above or equal to 0 ft LFD
  - Elevation below 0 ft LFD
- Illinois State Geological Survey (ISGS) data
  - Elevation above or equal to 0 ft LFD  
(Data collected with total station and prism pole)
  - Elevation below 0 ft LFD  
(2 Decimal places = data from total station and prism pole)  
(1 Decimal place = data from fathometer)
- N4467 Bathymetric survey line designation in  
Lake Forest coordinates
  - Reference stakes established in 1991 (with stake number)

Cartography by  
Matthew O. Alu and Christine S. Fucciolo



Illinois State Geological Survey  
Jonathan H. Goodwin, Acting Chief  
615 E. Peabody Drive  
Champaign, Illinois 61820-6964

Forest Park Beach control points (survey net established 1991)		
Lake Forest Coordinates	State Plane Coordinates	Elevation (ft. above LFD)
A 1 N 6000 E 2000	N 2035.01185 E 639.80349	8.076
A 2 N 7532.79 E 25040.77	N 2035.39727 E 639.90679	6.466
A 4 N 6524.89 E 15880.31	N 2034.43389 E 639.00837	6.706
A 6 N 6536.61 E 22615	N 2034.53827 E 639.51472	7.996
A 5 N 5617.39 E 2000	N 2033.00610 E 639.64875	8.185

